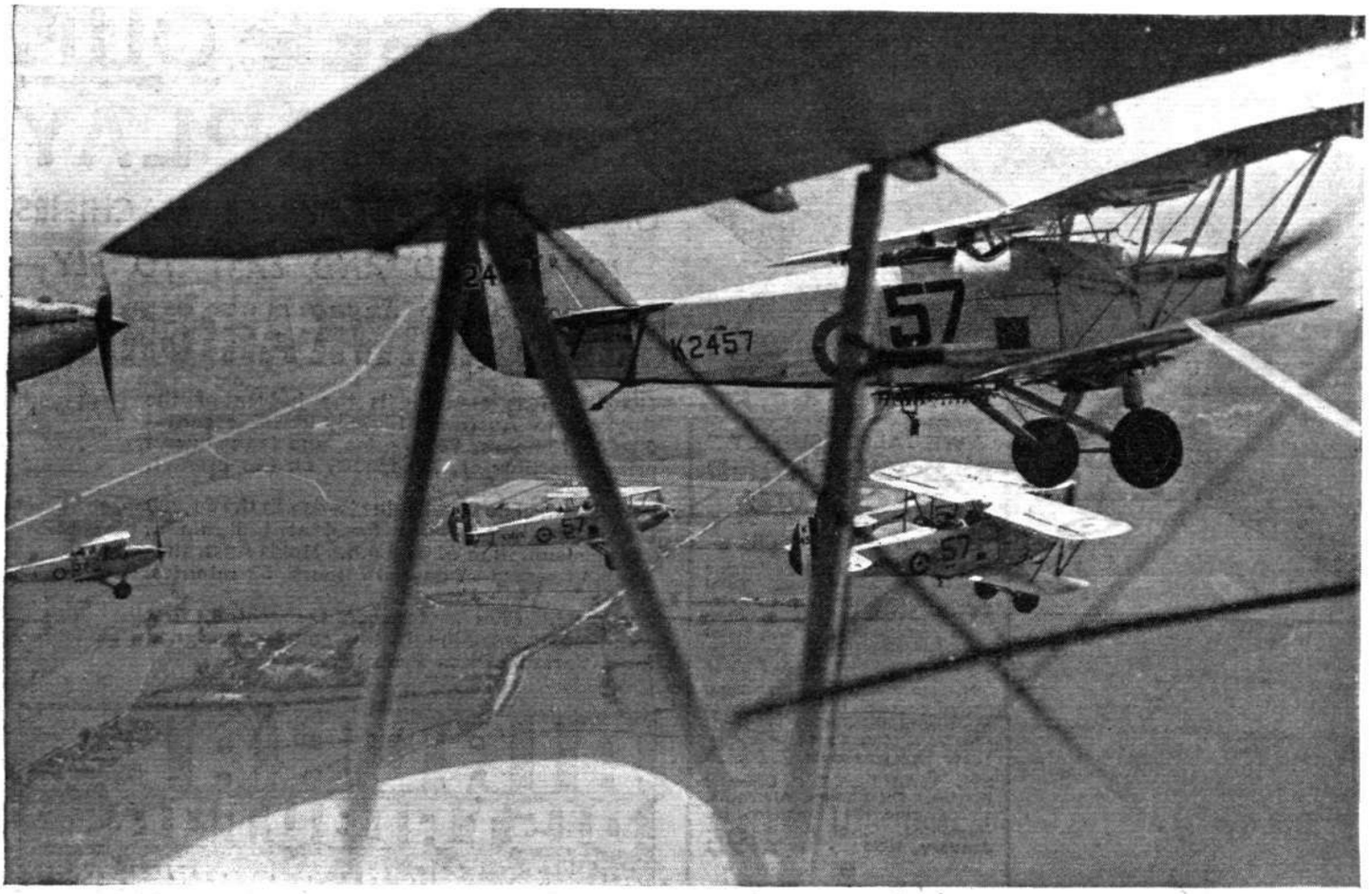

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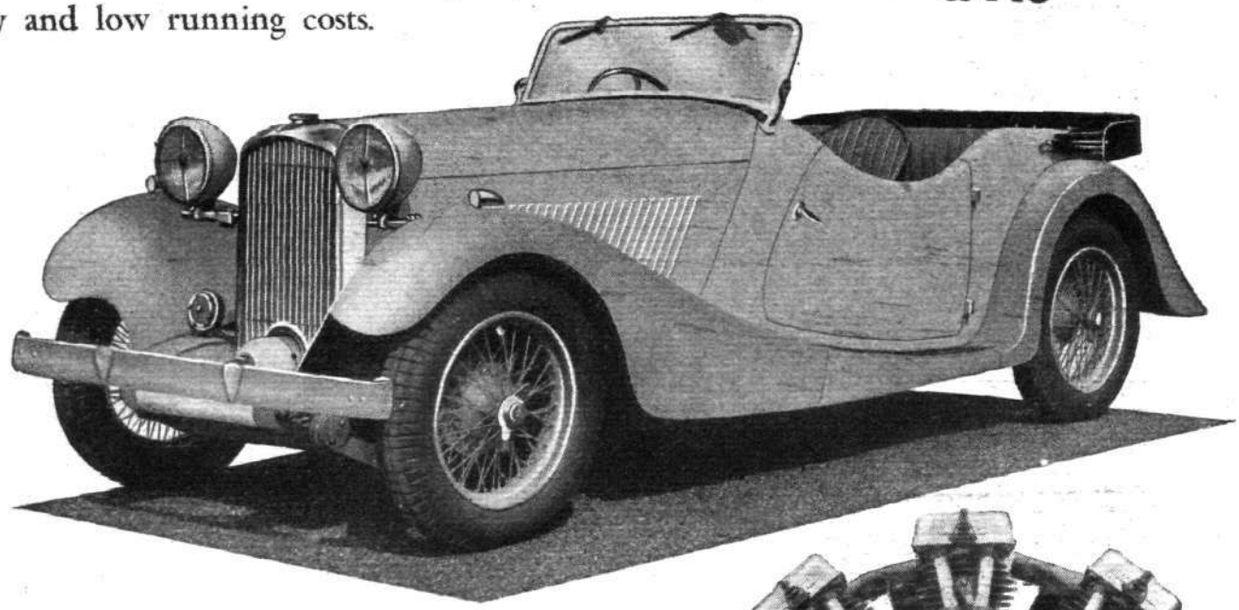

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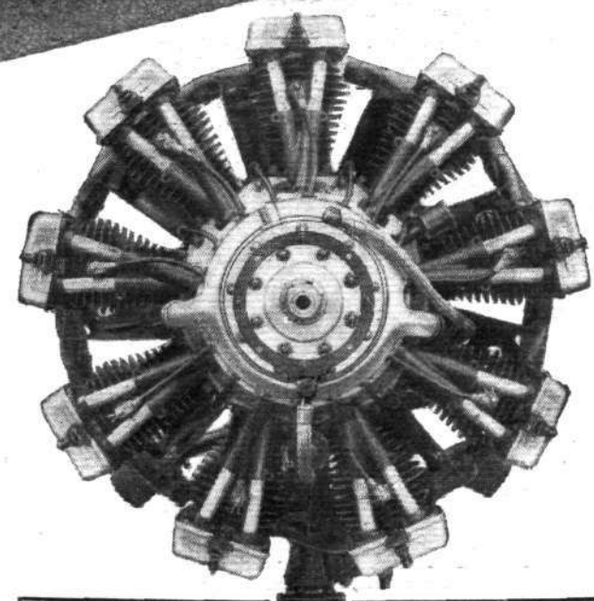

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Hendon Prospects

A WELL-KNOWN old saying avers that when March comes in like a lion it goes out like a lamb. June, in the year of grace 1935, has not exactly been copying March's behaviour by coming in like a lion; its behaviour up to the middle of last week rather suggested a mangy hyena. Perhaps that may be taken as a judgment on those who complained so loudly of the fine weather in the last two summers and in the early spring of this year. The month has, however, relented, and displayed some lamb-like qualities before taking a final farewell of us. We hope that it will particularly select the day after to-morrow for an exhibition of parting good humour. That day, we need hardly remind our readers, is the date of the R.A.F. Display at Hendon.

Always popular as the most beautiful flying show in the world, the Display this year will make a particular appeal to the public because of the great amount of talk there has been of late about the increase in the size of the R.A.F., as well as about Germany's air strength, the proposed Air Pact, and cognate subjects. This will in all likelihood be the last occasion on which the public will see the R.A.F. in its familiar form as the smallest Air Force owned by any of the great victor Powers. Next year there should be many new squadrons—new, that is, to the present generation, though they will be mostly reincarnations of splendid old squadrons which made great names for themselves in the war but were disbanded after the Armistice.

It will be a harder matter, then, to learn the Air Force List off by heart, and to be able to say without a moment's hesitation where each squadron is stationed, what type of machine it flies, and to which R.A.F. Area it belongs. Now it is easy to say (for example) that No. 12 B.S. used to have the "Fox," and for years was a thorn in the flesh of the Fighting Area during Air Exercises; or that Nos. 3 and 17 F.S. used to live at Upavon, and in the days of the "Woodcock" were regarded as the two night-fighting squadrons, that they were the first two squadrons to receive the "Bulldog," and that now they are stationed at Kenley. Next year familiarity with all the squadrons may be somewhat of a mathematical exercise, and it is quite conceivable that a demand may arise to add names to the numbers, so that squadrons may acquire individuality to those who find mere numbers a tax on the memory. The French have the *Esquadrille des Cigognes*, and the Germans name their squadrons after heroes like Boelcke and Richthofen, while our own Cadre and Auxiliary squadrons all have place-names, such as Ulster and County of Warwick. The regular R.A.F. might well follow suit.

The Flying Standard

Whatever the number of squadrons may be next year, we feel sure that the standard of flying will not be lowered. The air ability of the nation has not been exhausted by the demands of the present small Air Force. Speed without undue haste there will be in raising and organising the new units, but flying training, we may feel assured, will not suffer in thoroughness. Possibly the chief difficulty will be to find enough really capable commanding officers, for the qualities needed in these men have little to do with skill in handling an aeroplane. At present there are grand chances of promotion for really capable flight lieutenants.

The Display itself will this year be in part a preparation for the great review of the R.A.F. to be held by the King on July 6 at Mildenhall and Duxford. At Hendon there will this year be no set-piece, but instead a great fly-past by nine squadrons in formation. This will be practice for the still greater fly-past which is to be held at Duxford, and it will give those spectators who are not able to visit Duxford some idea of what the great review will be.

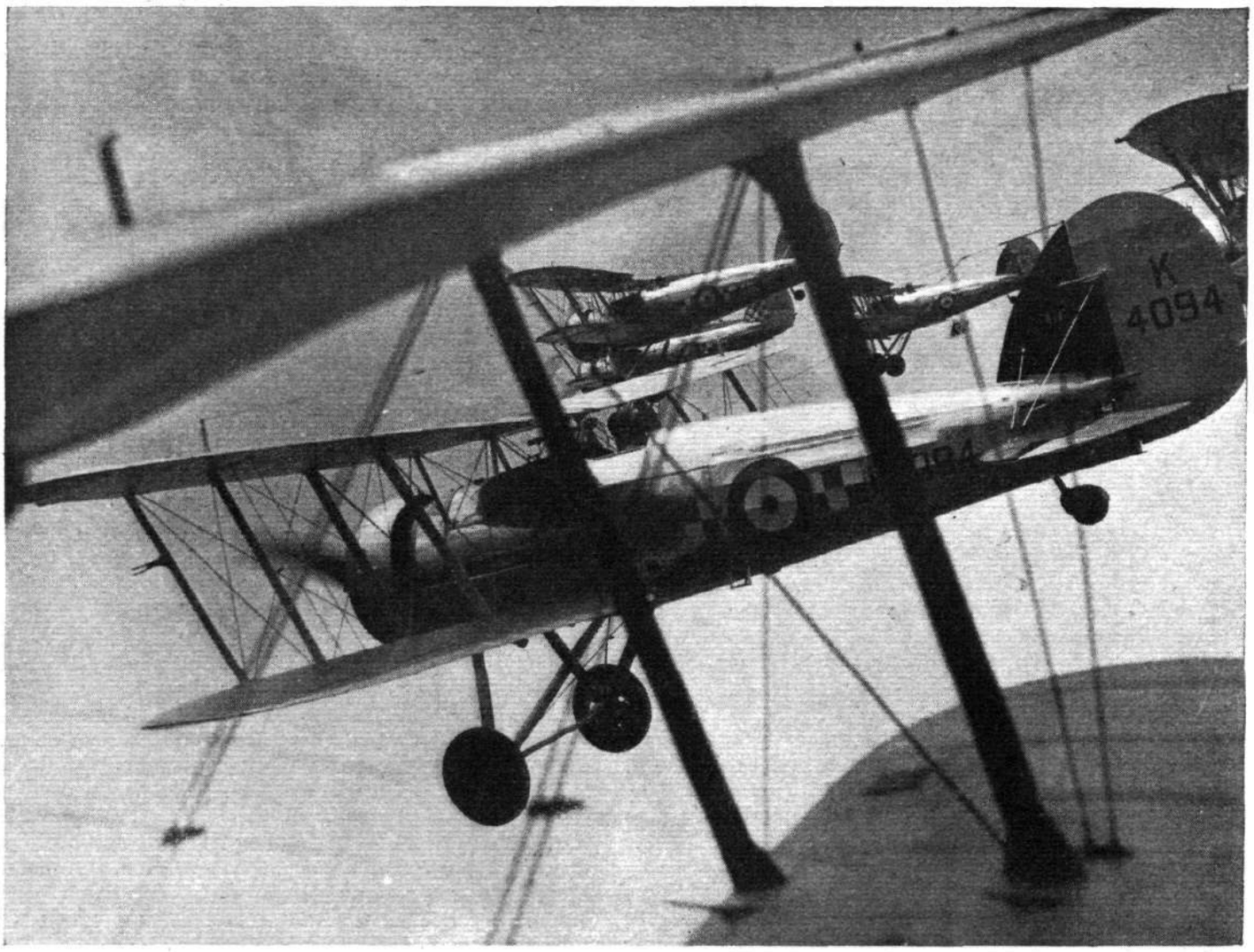
Another very welcome novelty at Hendon this year will be two practical exhibitions of parts of the scheme

of air defence. The public will be able to see for themselves how very quickly fighter pilots can get into the air on receipt of a raid warning, and they will also see the Observer Corps at work, spotting raiders and sending in reports, while Territorial artillery will engage the approaching enemy. These events will be good illustrations of the defence scheme, which is described in some detail in a special article in this issue. It is also particularly pleasing that the Observer Corps should take part in the Hendon Display, for their work has been well and faithfully done, but done under cover of darkness and at spots which are rightly kept secret by the authorities. On Saturday the Corps will be brought into the light of day, and they have well earned this distinction.

The Seaplane Record

HEARTY congratulations are offered by *Flight* to the French, and to the Latécoère firm and the pilot, Lieut. Hebrard, in particular, on winning the world's record for a long-range flight by seaplane. The flying boat *Croix du Sud*, which has flown from Cherbourg to Zinguinchor, a distance of 2,685 miles, in twenty-eight and a half hours, has been produced by the Latécoère firm as a long-range mail seaplane. It is driven by four Hispano-Suiza 650 h.p. engines, and her range with a payload of 2,210lb. and normal fuel supply is 2,980 miles. The record-breaking flight which she has just completed was, therefore, well within her powers, and there was nothing of the freak flight about it. In fact, the reason is yet to be given why the pilot did not take her on, as had been intended, to Konakry, 260 miles further south, in Senegal, which would also have been within her normal range.

At first sight it may seem curious to some that the landplane long-range record (also held by France) should be so much as 5,654 miles, while a flight of 2,685 miles should establish a new seaplane record. The real wonder is that the seaplane record should have been allowed to remain so low that a flying boat of a commercial type, not in any way designed or tricked out for record breaking, should be able to set up a new record without being even fully extended to the limit of her normal ability. The flying boat is rightly regarded as *par excellence* the long-range aircraft, and one would expect that if only commercial types are considered and special record-breaking freaks are disregarded, the seaplane record ought to be longer than that of the landplane. If a special record-breaking flying boat were to be designed by any one of a dozen designers it certainly ought to fly further than the *Croix du Sud* has done, but a flight by a normal commercial type has, generally speaking, the greater merit.

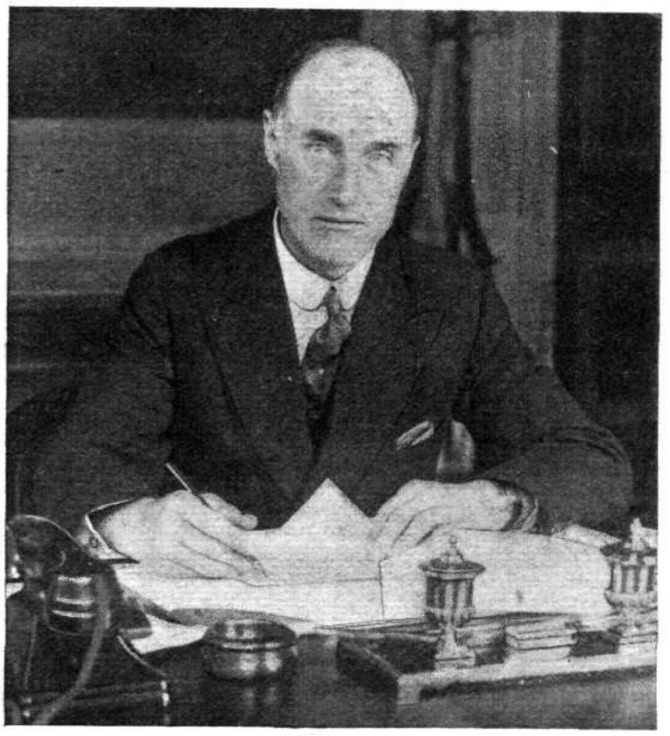


POETRY OF ACTION: This graphic picture of the new "Mercury"-engined "Gauntlets" of No. 19 (Fighter) Squadron in a concerted dive was secured by a *Flight* photographer from a two-seater "Bulldog" flying as one of the formation. The air drill by this unit—in all probability the best equipped of its kind in the world—will form a high-light in a brilliant programme at Hendon next Saturday.

The Outlook

A Running Commentary on Air Topics

A Message to Readers of *Flight* from Sir Philip Cunliffe-Lister, G.B.E., M.C., M.P., Secretary of State for Air.



I AM glad to have this opportunity of addressing the readers of one of our great Service journals.

Those of you who are visiting Hendon next Saturday know that you are going to see one of the most thrilling and absorbing spectacles that the Services can provide. For those who cannot go, these pages must supply something which will either recall happy memories of previous Displays or will serve as a guide to the imagination where no such memories exist.

There are many who have seen this Display in the best weather and in the worst. Let us hope for a repetition of the former; but one thing is certain, in fair weather or foul the Royal Air Force will carry out its job with characteristic efficiency.

Co-operation Abroad

IT has always been fairly obvious that commercial aviation, hampered as it is by the effects of prejudice, high costs and high taxes, cannot afford to give anything away. Wasteful competition is the very last thing that should be tolerated by operators, and it may be that big world developments and real progress will only be possible on an international basis.

Large-scale co-operation would reduce the overhead charges to a reasonable figure capable of easy absorption, and the pooling of technical and other resources would permit rapid advances all along the line.

It is particularly cheering, therefore, to learn that Air France and Deutsche Luft Hansa have agreed to share the mail operations over the South Atlantic. Both companies, it has long been believed, have been prepared to co-operate, but the political relations have been at war with common sense.

This little sign of sanity might be used to encourage a few of our own operators to meet one another with reasonable demands, and not to pretend that the "other" operator simply does not exist.

Selling Air Services

IT is, perhaps, early yet to complain that the travelling public is not making proper use of many of our internal air routes. Certain of the services—and, in particular, holiday services crossing the sea—are carrying full loads, and at least one other, by sheer perseverance, is becoming sufficiently well known to attract regular custom over a route which is more than tolerably well served by a fast railway system.

But many real time and trouble savers are only sparsely supported. A fortnight ago, for instance, at a medium-large airport, the writer watched four 6/7-seater machines come in from different parts of the country, and out of them stepped, in all, one passenger. Yet none of the lines charges fares that are much, if any, higher than those of first-class railway travel, and each service shows a considerable saving in time.

One can think of half a dozen reasons to explain the short passenger lists, the majority of which reasons are perfectly sound, and the travelling public, in any case, has still to become familiar with the idea of air travel.

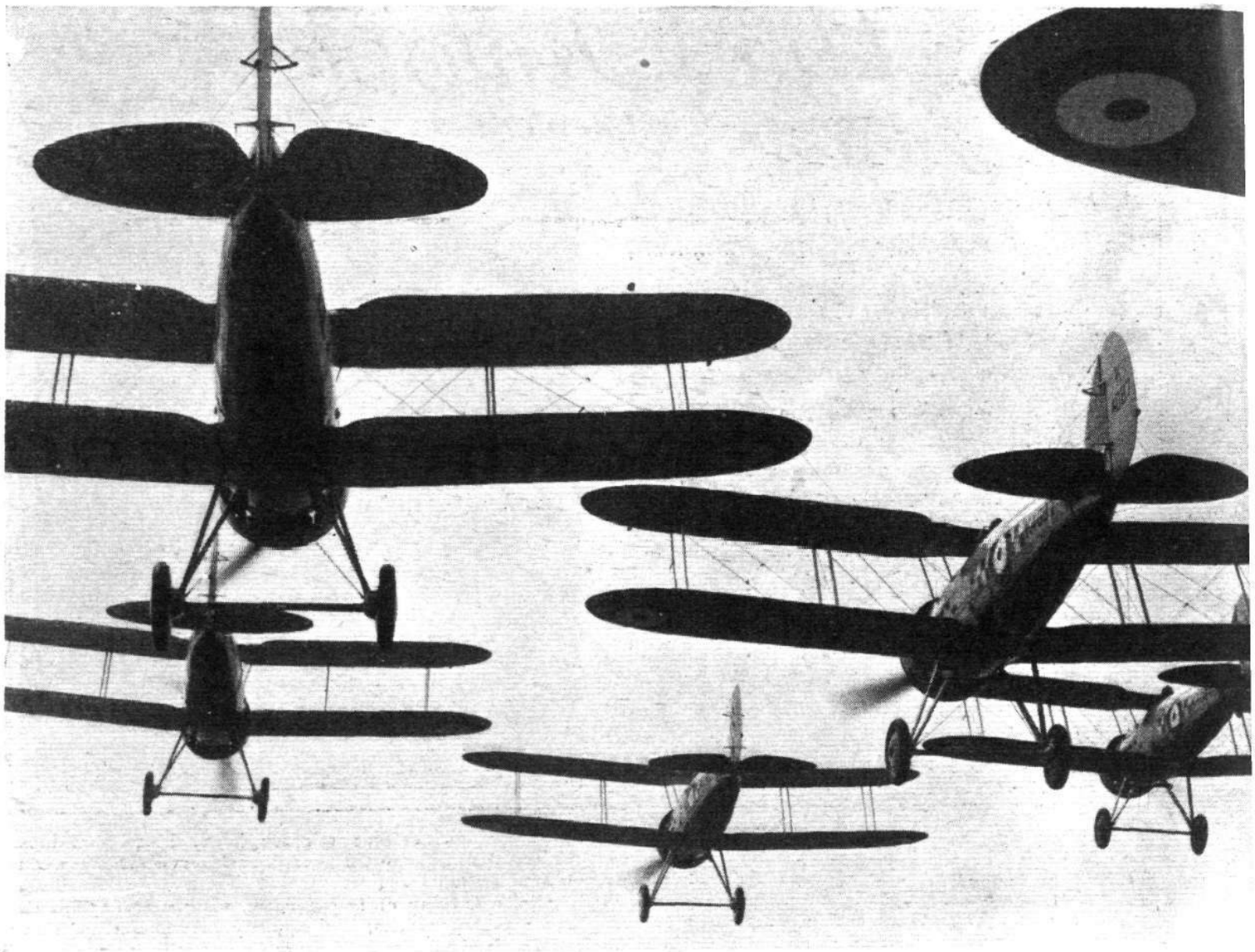
But are the air services being indirectly advertised as they should be? Only one in a thousand persons knows where to book and how to use an air service, and people as a whole are blissfully ignorant of the fact that an air service is operated between A. and B. Apart from any question of advertising widely and directly, means must be found for making an air service "news" of the best kind and of the "mouth to mouth" variety.

Jogging the Memory

EVERYBODY, one way or another, learns of the epic runs of the "Royal Scot," the "Cheltenham Flyer," the "Cornish Riviera Express," and even of the "Mancunian" and "Comet" services which bring Manchester within three and a quarter hours of London. Who has heard of the "Belfast Flyer," of the "Edinburgh Rocket," or even of the "Jersey Express" in quite those or similar terms?

"Belfast in three hours"; "Edinburgh in three hours"; or "Jersey in two hours." Written so, the statements are attractive, and we should find people using the services simply because it is the exciting or the obvious thing to do. Imperial Airways has, partly by virtue of its somewhat impressive name, become known to almost every member of the public, and few people who can afford to do so will travel to Paris other than by air—whether by Air France or by Imperials.

Probably a central air terminus for each town or city would bring aviation into the public mind as nothing else could ever do.



OUR FIRST LINE

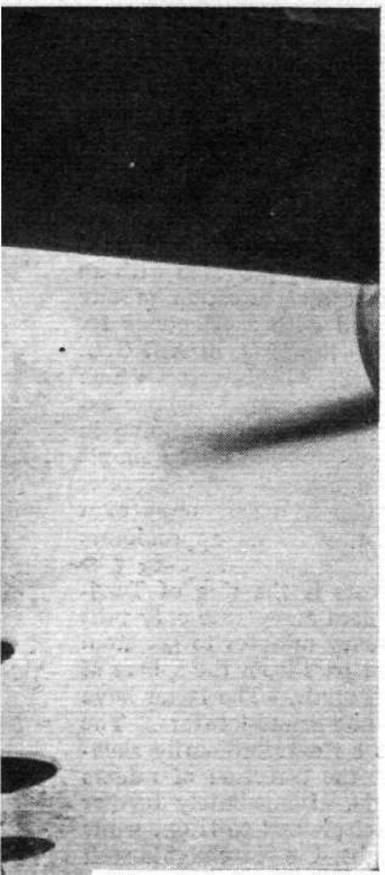
In the Event of War, the Royal Air Force would Probably be Engaged in Hostilities Before Any Other Service : This Article Explains the Constitution of Britain's Air Defence and of the R.A.F. in General

By MAJOR F. A. de V. ROBERTSON, V.D.

AIR expansion is the topic of the day. No person in this country wants war, and no Power in Europe, it may safely be said, wants war, but all people want to feel strong enough to make an air attack upon them a very risky adventure. Countries and seas can be made reasonably secure, but no person knows what would happen if his homeland were suddenly attacked by air. This has caused a general nervousness in Europe. Limitation of air armaments has been proposed, but very little progress has been made with practical plans. Britain for over twelve years kept her Air Force at the smallest possible numbers, but her example was not followed, and now that force has to be trebled in a very great hurry. Only if we are at least as strong in the air as any neighbouring Power can we feel any sense of security.

The decision to increase the Royal Air Force has been welcomed by the British people, but very few of them know much about that Force. It is recognised as our first line of defence, because, if war should come, the Air Force would probably be fighting before the Navy had fired a shot and while the Army was still mobilising. The organisation of such a Force must surely be an interesting study to all, and particularly to the young men of all classes who are anxious to join it. Let us examine its scheme of defence and also its composition. The reader will be hard to please who is bored by such a subject.

Far too much has been made of the saying that there is no defence against air attack, and that counter-attack is

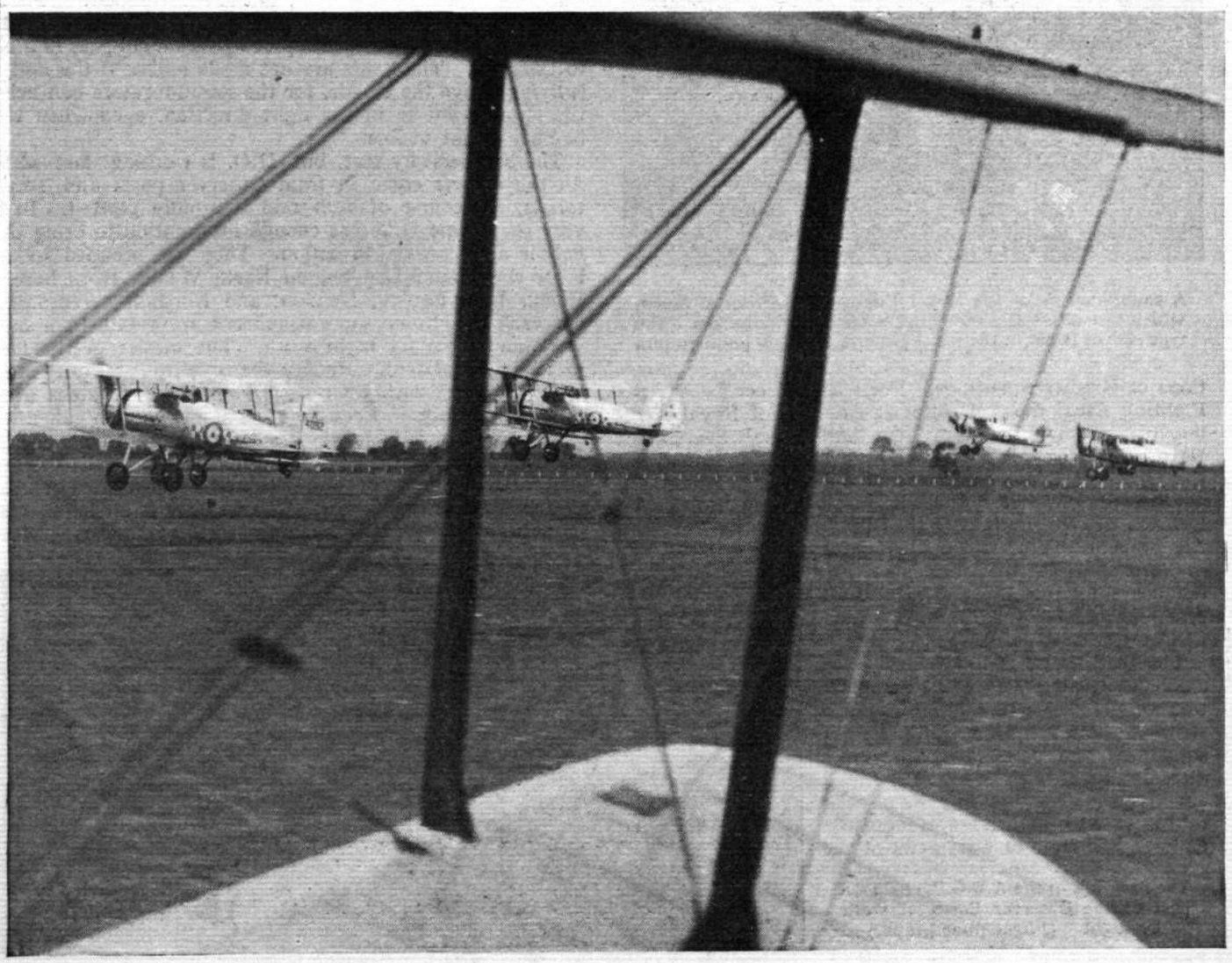


Gloster "Gauntlets" of No. 19 (Fighter) Squadron—the latest and fastest type of fighter in service in the world. Its top speed at 15,800 feet is 230 m.p.h. These remarkable *Flight* photographs were taken from a two-seater "Bulldog" which flew as a member of the single-seater formation.

the only step to take. That is only true up to a point. A very great deal can be done in the way of air defence, and, judging by experiences in the Great War, the defence may so far master the attack that the latter will become too expensive a game, too much like the operations of a suicide club, and will be abandoned. Likewise, there has been a lot of foolish talk about the counter-attack. It has often been assumed far too readily that all air raids are deliberate attempts to slaughter the civil population on the other side in the hope that the voters of the enemy will force their Government to sue for peace. Nothing has ever happened either in the last great war or in any previous war to justify the belief that "frightfulness" is likely to have such a result. Wars have been won by breaking the enemy's power to fight, not by trying to intimidate civilians. We may take it that air raids will aim at destroying military objectives such as munitions factories, railway stations, harbours, and such like. Civilians may not entirely escape such attacks, but they will not suffer from them as they would if gas bombs were to be dropped on residential areas.

The plans for the air defence of Great Britain make a very fascinating study. One complete section of the Royal Air Force is devoted to this business, and it is known as the Command, Air Defence of Great Britain, or for short, A.D.G.B. The officer who is at the head of this organisation has the title of Air Officer Commanding-in-Chief, and we may allude to him as the C.-in-C. The term has a familiar smack about it, and recalls the days of Lord Wolseley and Lord Roberts. The present C.-in-C., A.D.G.B., is Air Chief Marshal Sir Robert Brooke-Popham, K.C.B., C.M.G., D.S.O., A.F.C., who before the war was squadron commander of No. 3 Squadron, R.F.C. His rank is the equivalent of Admiral in the Navy and General in the Army.

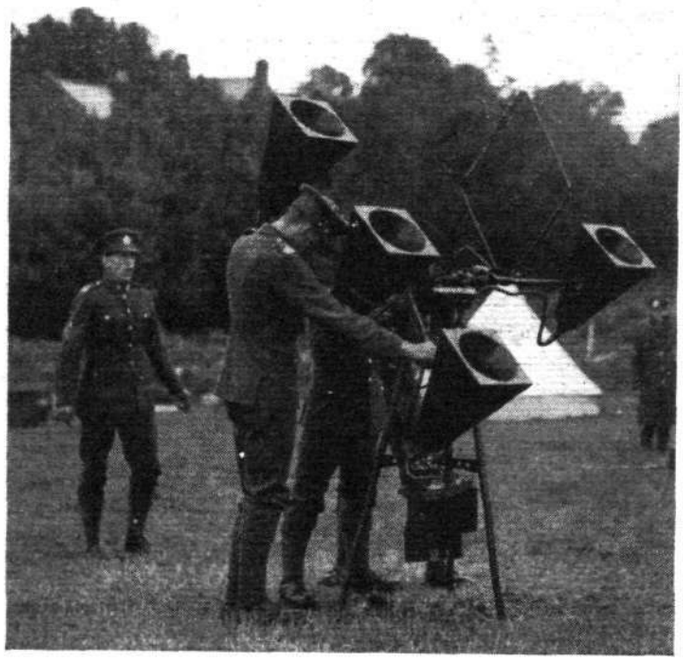
Here we may, perhaps, turn aside for a moment to mention all the ranks in the R.A.F. and give their equivalents in the Navy and the Army. The highest rank is Marshal of the Royal Air Force, which is equivalent to Admiral of the Fleet and Field Marshal. Next comes Air Chief Marshal, which was explained above. Air Marshal ranks with Vice-Admiral and Lieutenant-General; Air Vice-Marshal with Rear-Admiral and Major-General. The next three ranks are practically borrowed from the Navy: Air Com-



Our First Line

modore is equal to Commodore and Brigadier-General; Group Captain to Captain (R.N.) and Colonel; Wing Commander to Commander and Lieutenant-Colonel. R.A.F. officers of the rank of Air Commodore and upwards are termed "Air Officers," much as the Navy speaks of "Flag Officers." In the more junior ranks, Squadron Leader is the equivalent of Lieutenant-Commander (R.N.) and of Major; Flight Lieutenant of Lieutenant (R.N.) and of Captain (Army); Flying Officer of Sub-Lieutenant (R.N.) and of Lieutenant (Army). Lowest of all in the R.A.F. is Pilot Officer, but it must be added that before a Pilot Officer qualifies for the full pay of his rank he may have to go through the preliminary stages of Acting Pilot Officer and Acting Pilot Officer on Probation Provided that a Pilot Officer behaves satisfactorily, he is promoted to Flying Officer after eighteen months' service, but after that step promotion is by selection on merit.

To return to the Command, A.D.G.B., the C.-in-C. has under him two Areas for the counter-attack, namely, the Western Area and the Central Area; which are organisations of bomber squadrons. For pure defence he has the Fighting Area, the Anti-Aircraft Brigades of Royal Artillery of the Territorial Army, the Anti-Aircraft Searchlight Battalions of Royal Engineers of the Territorial Army, and the Observer Corps composed of Special Constables. In addition to these organisations, he has also No. 1 Air Defence Group, comprising the squadrons of the Auxiliary Air Force, three of which are fighter squadrons while the remainder are bomber squadrons There is also an organisation of balloon aprons, which will be described later.



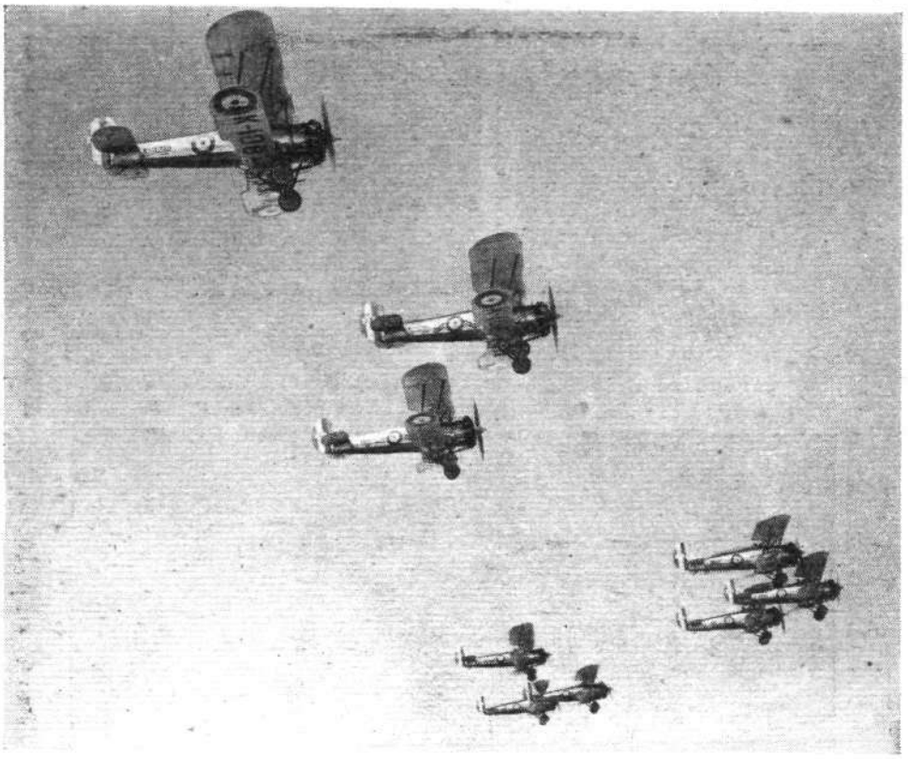
A sound-locator of the Royal Engineers, Territorial Army, which can direct the searchlights on to night raiders. The type shown is not of the latest pattern. (*Flight* photograph.)

The secret of effective defence against air raids is rapid communication of information. The C.-in-C.'s striking forces are primarily the fighter squadrons and secondarily the anti-aircraft guns, but these cannot be used effectively unless prompt news of each raid is sent to the headquarters of the C.-in-C. In time of war, news of the start of a raid may be sent in by British agents abroad or by ships at sea, but as soon as the raiders have crossed the British coast the C.-in-C. must depend on the organisations mentioned above. The first people to play their part are the posts of the Observer Corps. The members of this remarkable body of men are all civilians, mostly villagers, who wear no uniform except a badge, but are sworn in as Special Constables. Little groups of them are stationed in an outer ring miles away from London (other towns will be ringed in the same way when the scheme is fully matured), each post or group being provided with an instrument for gauging the height and direction of any raiders who are seen or heard, and with a telephone for passing the news with all speed to the H.Q. of A.D.G.B. or of the Fighting Area. In all the Air Exercises which have been held the work of these Observers has been excellent, but they naturally do not get much training in peace time, while their instruments must needs be simple to operate and therefore not too meticulously accurate. Still, they are invaluable for giving the first news of a raid which has crossed the coast, with its approximate direction and height.

Inside the ring of Observer posts is the ring of Territorial guns and searchlights. Modern aeroplanes only take from a quarter of an hour to twenty minutes to get from the coast to London, so they soon pass from the sphere of the Observers to that of the Territorials. The latter have more accurate instruments, including sound-locators. The latest pattern of sound-locator is an extraordinarily accurate affair, and it can point out the direction of raiders flying in darkness or above clouds. Immediately further and more precise information is telephoned to H.Q., while the guns get busy and, if it is night, the searchlights seek to concentrate on the enemy aircraft. By night the raiders come in by single machines, not in formation. Three searchlights and no more should concentrate on a single enemy bomber, and one group of lights should pass him on to the next. The lights are not made useless if the raider is flying above the clouds, for the sound-locators can keep the lights pointing in the right direction, even when the bomber is not visible.

The bombers fly fast, but H.Q. is working fast also. As the reports come in from Observer posts and Territorials, the course of each raid is rapidly plotted. In a very short time H.Q. has enough information to bring the fighter aeroplanes into action. They are grouped in an inner ring round London, on North Weald, Hornchurch, Biggin Hill, Kenley, Hendon, and Northolt aerodromes. On each aerodrome some squadrons are detailed for day work and some for night work. The tactics of the two periods are different. By day the squadrons on duty stay on the ground with their aeroplanes ready to start at a moment's notice. Each aerodrome has its own sphere of action or zone, outside which its squadrons will not work. As H.Q. learns of the direction of a certain raid, orders are sent to the aerodrome best situated to deal with it. In two minutes or less the squadron on duty is in the air and climbing up to the height mentioned in the orders. Great

The first link in the A.D.G.B. chain—a post of the Observer Corps at work by night. (*Flight* photograph.)



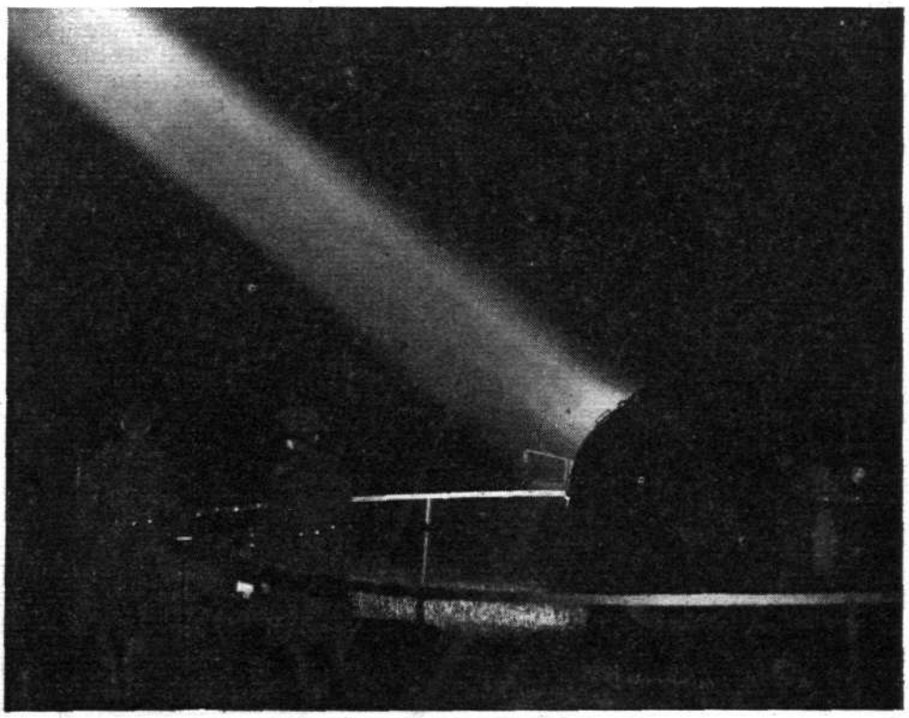
The backbone of our day-and-night fighter equipment — the well-tried Bristol "Bulldogs," which have been used by the majority of fighter squadrons during the past few years. (*Flight* photograph.)

powers of speedy climb are necessary in the day fighters, and great speed at high altitudes. Further news of the raid is sent by wireless to the fighter squadron after it is in the air, but the best help may come from the guns. If the sky is clear it is easier to spot aircraft from the ground than from the air, while if it is cloudy the sound-locators can direct the guns.

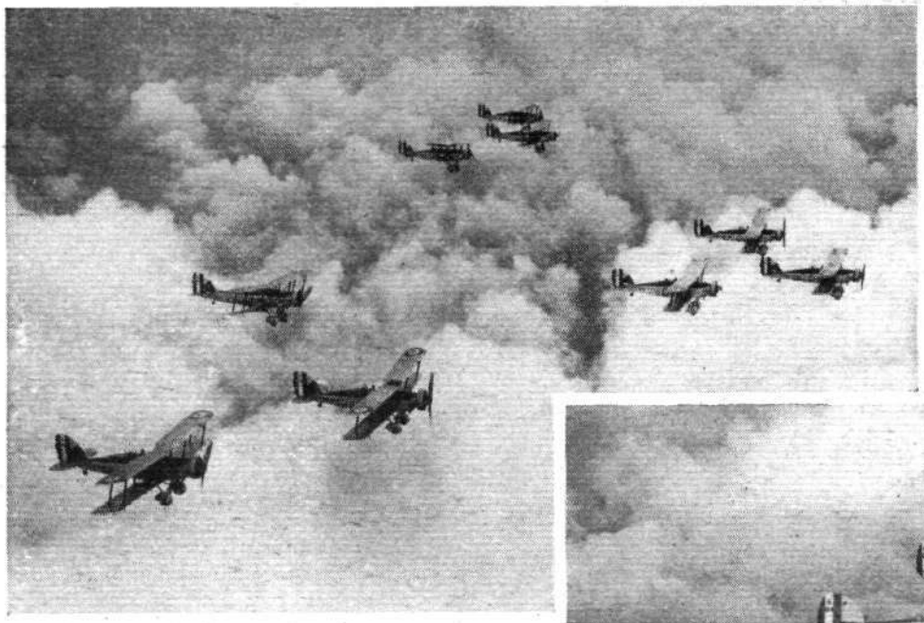
By night the tactics are different. The fighters do not wait on the ground for orders to take off and attack a raid. Single machines are sent up on patrol at various levels in their own zones, in readiness for the arrival of a bomber. For this reason night fighters need a longer air endurance than is necessary for day fighters. The night fighters rely almost entirely on the searchlights. When three beams are seen concentrating on a certain spot, the nearest fighter flies up to investigate. In the ensuing fight all the odds should be on the side of the fighter, which attacks out of the darkness and should never present a target to the guns of the bomber.

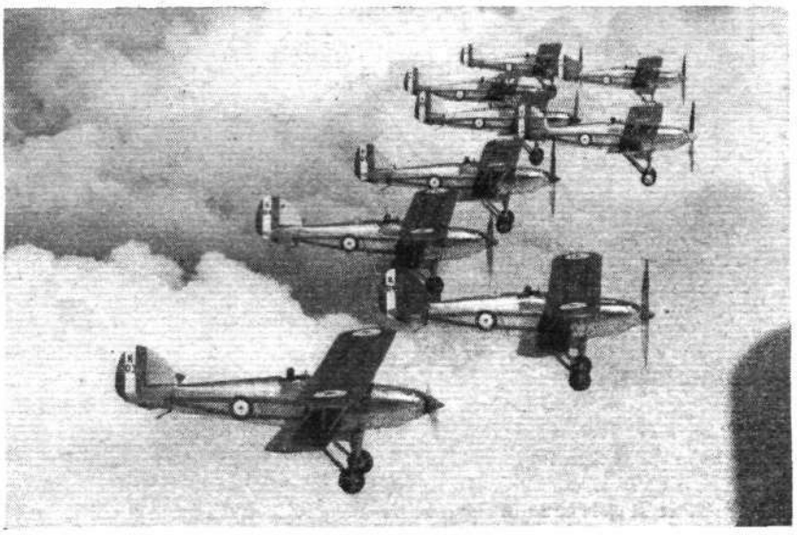
If the night bomber evades the searchlights and the fighters, it still has to face the dread chances of the balloon apron. A number of captive balloons are sent up with horizontal cables strung between them. From each of these cables other wires are hung. If an enemy aeroplane hits any of these wires or cables a crash is almost certain. The height to which the balloons can be sent up is kept secret, and, of course, the position of the aprons can be changed every night. This unseen horror of the darkness is calculated to shake the nerves of the most intrepid invaders.

A night raider, if his raid is to be completely successful, needs special conditions. He likes clouds to give him cover on his way in and out, but his target must be clearly visible. Not many nights in a year give absolutely ideal conditions for a night raid. Apart from the chances of casualties, it should be remembered that if the defence succeeds in driving either day bombers or night bombers away from their allotted objectives, the raids may be counted as failures. This point should be strongly stressed. Bombs which miss their targets are, as a rule, wasted. Guns may not hit many of the bombers, but by driving them up to great heights make their work more difficult, and if they cause a formation to break up they have done much to foil a raid. Attacks by fighters, even if they do not shoot many of the enemy down, score a point if they can break the enemy formation or drive the bombers off their course. Another point to bear in mind is that objectives which are far from the coast give a much better chance to the defence than do objectives near the coast. It should be easier to defend the Midlands and the North than it is to defend London. The last raid made on London was on Whit-Sunday, May 19, 1918, when between thirty and forty large bombers, mostly "Gothas," but at least two of them "Giants," came in a constant stream over Kent and Essex on the way to London. Our defensive night fighters were up in numbers, and twelve air combats took place. In these three "Gothas" were shot down, while others were probably badly shot about. At any rate, three more crashed completely when they landed in Belgium. The guns also made good shooting that night, and brought three of the raiders down. That accounted for nine, while a tenth had engine failure and landed in Essex. The raid certainly did a good deal of damage, but the enemy evidently reckoned that a loss of about 30 per cent. was too high a price to pay, and they never came over London again.



Groundwork: A searchlight of the Royal Engineers, Territorial Army. (*Flight* photograph.)





These three pictures illustrate different aspects of R.A.F. work. To the left is a Cadre squadron, No. 501 (City of Bristol) (Bomber) Squadron, flying "Wallaces," two flights of which are manned by Special Reserve personnel. In the top right corner is a "Rota" used for Army co-operation work; and below it is No. 1 (Fighter) Squadron from Tangmere, flying "Fury" machines in the formation "Flights Abreast." (*Flight* photographs.)

Though modern heavy bombers are much more formidable and faster than the "Gothas" and "Giants" of 1918, the defence is now also much stronger. The searchlights and the guns are now much better, and in particular the improvement in the design of range-finders and sound-locaters is very great. Complete immunity from bombing cannot be guaranteed to any place, but there is every ground for believing that raiding can be made quite as expensive a game for the enemy as it was proved to be in May, 1918. No Air Force or Flying Corps could for long endure a loss of 30 per cent. of its strength in a night.

A Short Service commission officer under training at No. 3 Flying Training School, Grantham, receiving instruction in plotting a course for a cross-country flight. (*Flight* photograph.)

The counter-attack, that is our own bombers, will, of course, strike at military objectives in the enemy country. Aircraft factories will be particularly desirable objectives, and also aerodromes when they can be found, for then the wasps will be destroyed in their nests. The counter-attack is also likely to have another result. Certain types of light bombers are quite suitable for use as two-seater fighters, and if the counter-attack is heavy some squadrons of these light bombers are likely to be kept at home to aid the defence. If we can force the enemy to take such a step as that, our offensive will aid greatly in reducing the intensity of the attacks on London and the homeland in general.

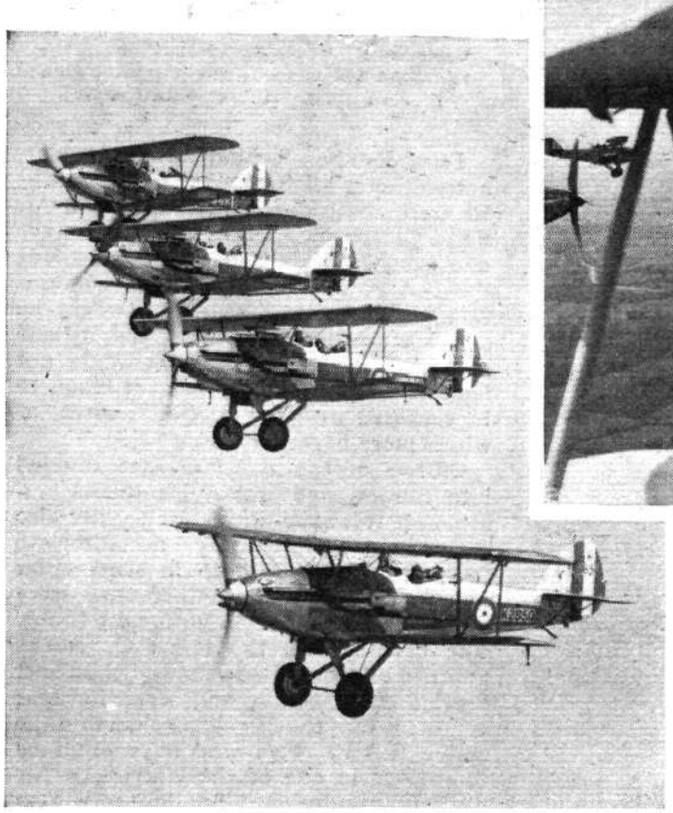
The above brief account will, it is hoped, help readers to understand something of the very interesting subject of air defence. The Air Force itself, which is responsible for that defence, is still an unfamiliar subject to many. *Flight* constantly receives enquiries as to how to join the Air Force, whether there is a "Territorial" Air Force, and so on. It is hoped that the following explanation will make the matter clear.

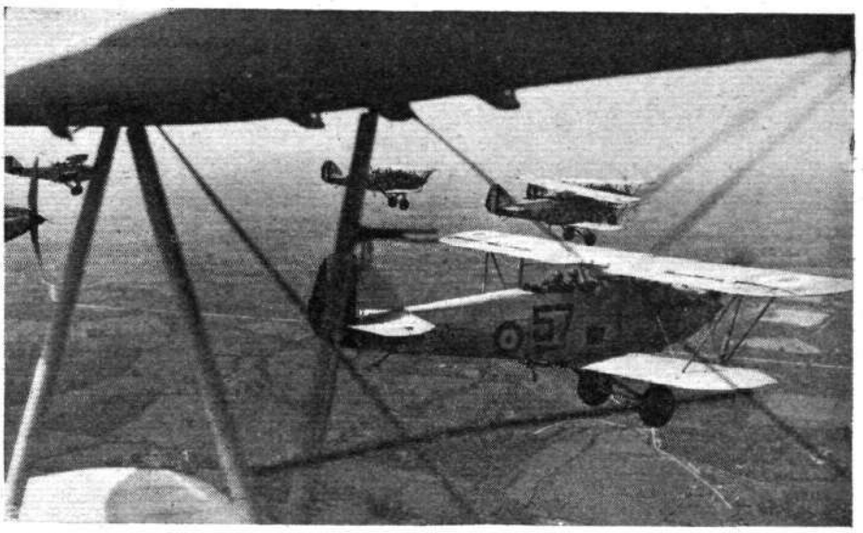
The Royal Air Force consists of officers and airmen. Every member of it who is not an officer is known as an airman. We will consider the officers first. That are eight branches, namely, the General Duties Branch, which means in effect the officers who fly; the Stores Branch, the Accountant Branch, the Medical Branch, the Dental Branch, the Legal Branch, and the Chaplains Branch. The same titles and badges of rank are used in all branches, and the sufferer from toothache may be tended by a Flying Officer who knows much about forceps but nothing about a joy-stick. Chaplains are granted the "relative" rank of Squadron Leader, etc. It may be noted in passing that five of the R.A.F. Chaplains hold the Military Cross. In all branches there are two sorts of commissions, namely,

Flight Photo.

THE HAWKER "DEMON." Rolls-Royce "Kestrel" engine. A two seater aircraft possessing excellent fighting qualities and unequalled performance.

[ADVT.





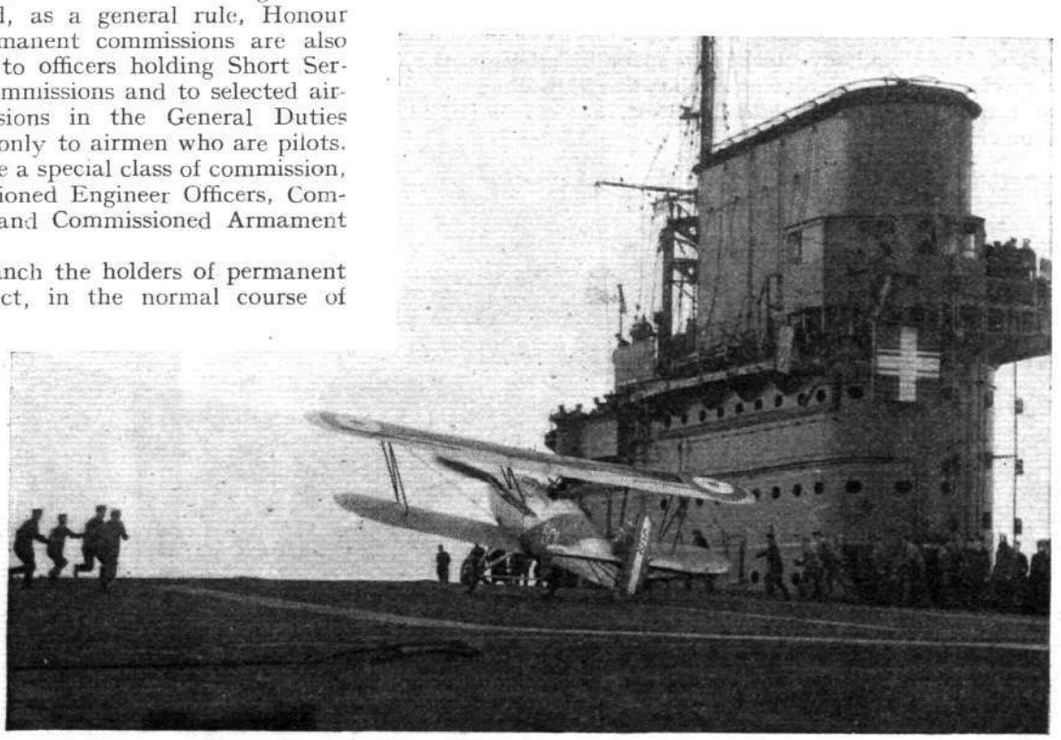
Two-seater fighters were much used during the war and were re-introduced into the R.A.F. a few years ago. The "Demon" is the standard type, and the picture on the left shows a flight of "Demons" of No. 23 (Fighter) Squadron, which is stationed at Biggin Hill. On the right is No. 57 (Bomber) Squadron at Upper Heyford, flying the "Hart," which is the fastest light bomber in the R.A.F. (*Flight* photograph.)

permanent commissions and temporary commissions. The latter are divided into Short Service commissions and Medium Service commissions. The usual way of obtaining a permanent commission is to pass as a cadet through the R.A.F. College at Cranwell, where, after a two years' course, the cadet is turned out as a qualified pilot and a fully trained officer. A number of permanent commissions are given every year to men who have taken degrees at recognised Universities, and, as a general rule, Honour degrees are expected. Permanent commissions are also granted, though sparingly, to officers holding Short Service and Medium Service commissions and to selected airmen. Permanent commissions in the General Duties Branch are usually granted only to airmen who are pilots. Technical airmen may receive a special class of commission, and are known as Commissioned Engineer Officers, Commissioned Signals Officers, and Commissioned Armament Officers.

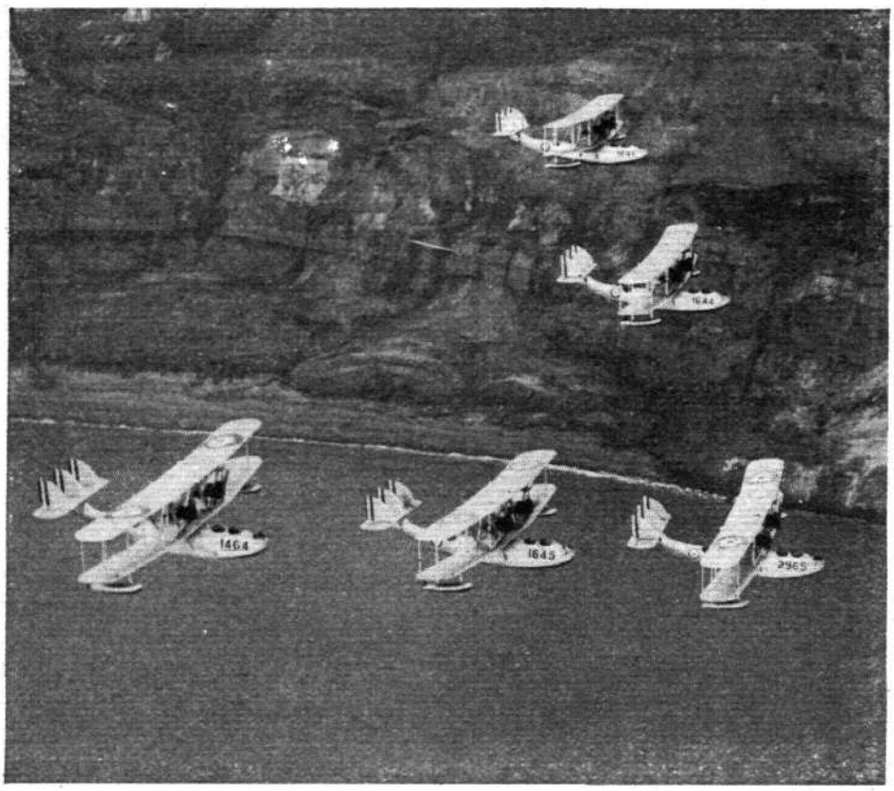
In the General Duties Branch the holders of permanent commissions may all expect, in the normal course of events, to make the Service their career and to rise to high, or fairly high, rank. At the top of the tree only a few officers are needed, but many pilots are needed to fly the aeroplanes in the squadrons. Only a few of them could expect to rise to high rank, and therefore it is considered necessary to find a large number of pilots who will have no such expectations. A proportion of this number is provided by the sergeant pilots, and the rest by Short Service officers. In fact, the great majority of the officers in the R.A.F. hold Short Service commissions. These officers are chosen by direct appointment, and after selection are sent to one of the Flying Training Schools to be taught to fly. They are also trained in all the other duties of an officer. The University officers, although they may have already learnt to fly and have received a fair amount of other training, are also sent for a finishing course before they are posted to squadrons.

Short Service officers undertake to serve for six years in squadrons or wherever they may be posted, and then remain on the Reserve for four more years. Some are granted Medium Service commissions, which means that their service in the squadrons or elsewhere is extended to a total of ten years. The Reserve will be explained lower down.

The airmen in the R.A.F. are divided into warrant officers, non-commissioned officers, aircraftmen and aircraft-



A "Nimrod" single-seater fighter landing on the flying deck of H.M. Aircraft Carrier *Courageous*. The bridge and funnels and other top-hamper are all contained in the structure on one side of the deck. (*Flight* photograph.)



No. 201 (Flying Boat) Squadron, which is stationed at Calshot, flying in formation past the Landslip, near Ventnor. The boats are "Southamptons," but the squadron will soon be re-equipped with a modern type. (*Flight* photograph.)

hands. Aircraftmen are skilled mechanics belonging to a recognised trade, and various trades are recognised in the R.A.F. The most important trade is fitter (aero engine), and there are also armourers, wireless operator mechanics, photographers, instrument makers, metal workers and others. Aircrafthands are not skilled tradesmen, though they may be partially trained in some trade. They do all the work which does not require high technical skill and special training. Sentries, for example, are usually aircrafthands, and a number of them become air gunners; though air gunnery is also open to aircraftmen, especially armourers, photographers, and wireless operators.

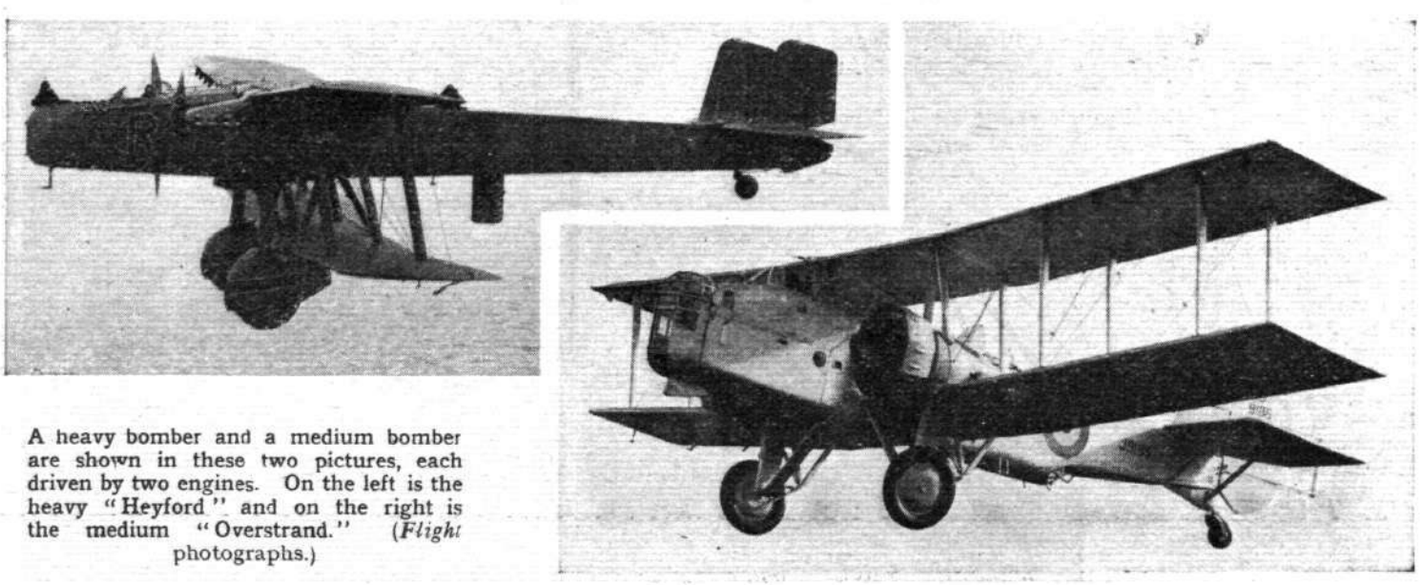
The R.A.F. prefers to catch its aircraftmen young and to train them up in the way it would have them go. Two schools are maintained for aircraft apprentices, Halton and Cranwell. At Cranwell is the electrical and wireless school, which is not to be confused with the Cadet College, also at Cranwell. There the wireless operator mechanics and instrument makers are trained, while the fitters and other tradesmen are trained at Halton. Boys are accepted between the ages of fifteen and seventeen, and spend about three years at a school, receiving a general education as well as technical training. Aircrafthands, however, are enlisted direct from civil life.

Immediately behind the regular, active Royal Air Force stands the R.A.F. Reserve, consisting of the Reserve of Air Force Officers (R.A.F.O.) and the Reserve of Airmen. A point to remember about the R.A.F. Reserve is that on mobilisation all the officers and men would be called up and sent to join the regular R.A.F. The R.A.F. Reserve would not fight as a separate body—and it is not to be confused with the Special Reserve, of which more hereafter.

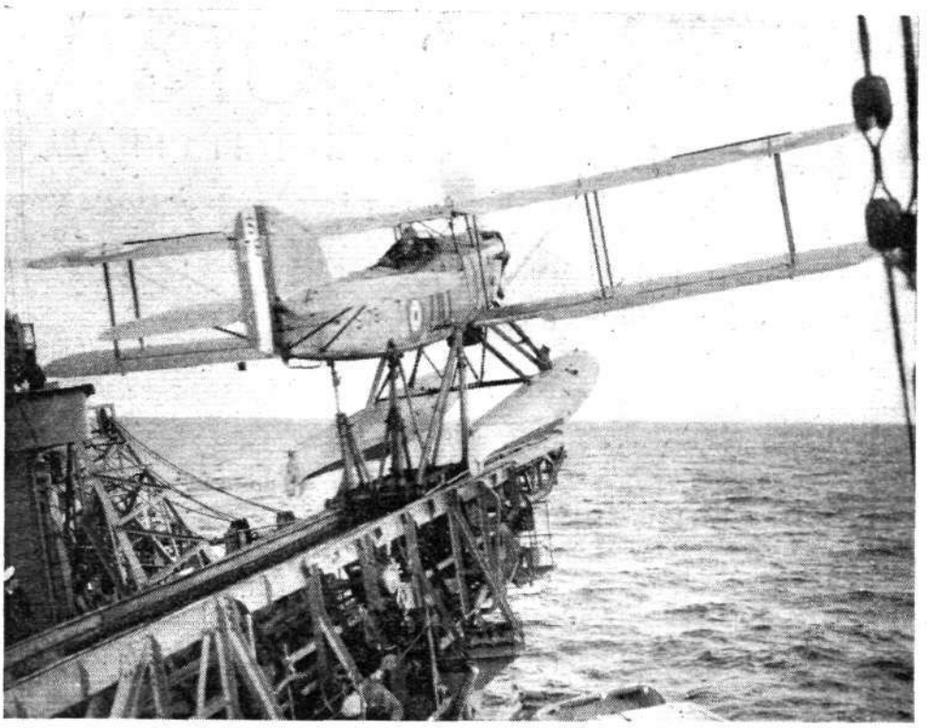
Officers of the R.A.F.O. are divided into classes, some for flying duties and some for technical duties. They are also divided in another way, according to whether they have been in the regular R.A.F. or not, and whether they have learnt to fly or have to be taught to fly. The backbone of the R.A.F.O. is the number of officers who have held Short Service commissions, and serve for four years in the Reserve after leaving the active R.A.F. Men who have obtained the necessary qualifications in one of the University Air Squadrons (at Oxford, Cambridge, and London) may also be granted commissions in the Reserve. But men with no previous experience of flying may also join the Reserve and be taught to fly at the Government's expense. Until quite recently they were given commissions in the Reserve, but now they must join in the rank of sergeant pilot, and may receive commissions later on. These men are taught to fly at one of the civilian flying schools approved by the Air Ministry. Until recently there have been four such schools, at Hamble (near Southampton), at Bristol, at Hatfield (Middlesex), and at Brough (Yorkshire). In view of the expansion of the R.A.F. which is taking place, the number of civilian schools will be increased.

The advantages of joining the Reserve are obvious. A man who is accepted is taught to fly at no cost to himself. He is not expected to buy uniform. He receives a retaining fee of about £30 a year, and his only obligation in time of peace is to put in twenty hours' flying every year at one of the flying schools. In case of war he would be called up and posted to one of the regular squadrons.

The Special Reserve is quite a different sort of organisation. In the R.A.F. there are a certain number of squadrons known as Cadre squadrons. All those squadrons with



A heavy bomber and a medium bomber are shown in these two pictures, each driven by two engines. On the left is the heavy "Heyford" and on the right is the medium "Overstrand." (*Flight* photographs.)



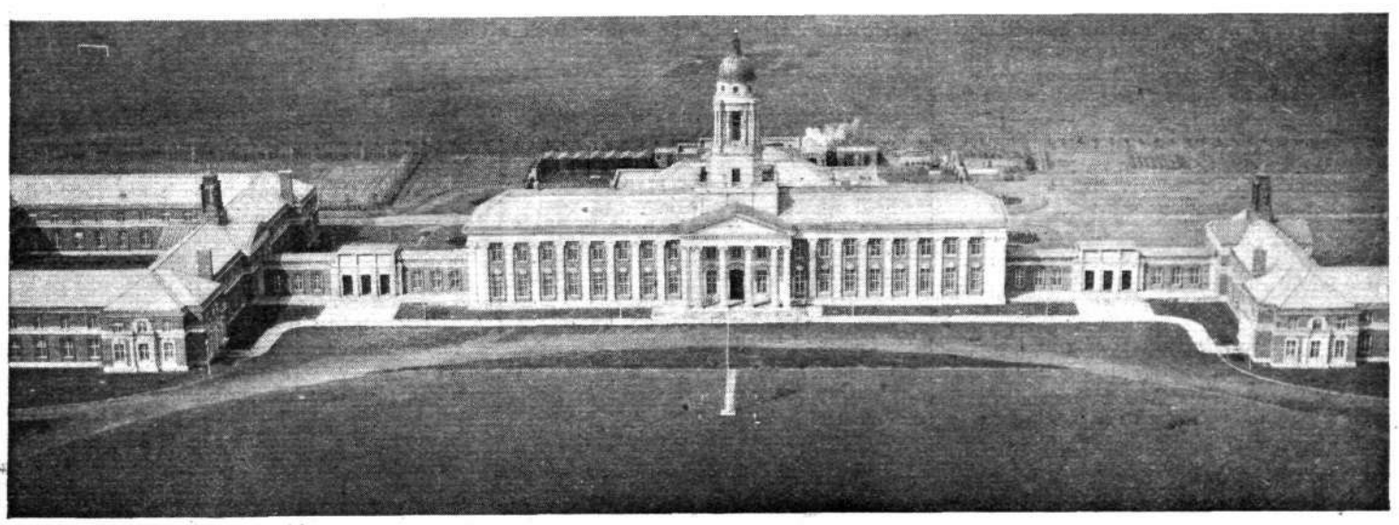
A Fairey IIIF floatplane on the catapult of the cruiser H.M.S. *Exeter*. All capital ships and cruisers will soon be fitted with one or more catapults for launching seaplanes. (*Flight* photograph.)

numbers between 500 and 600—*e.g.*, No. 501 (City of Bristol) (Bomber) Squadron—are Cadre squadrons. In all these squadrons the commanding officer is a regular, and there are in the squadron enough regular officers and airmen to man one flight. The remaining officers and airmen belong to what is called the Special Reserve. They are civilians who volunteer to give their services, mostly without pay, to the squadron in their spare time. In the event of mobilisation, they would be called up and normally would serve throughout the emergency with their own squadron. In this respect they are quite different from the R.A.F. Reserve, who are not organised in squadrons, and who would, on mobilisation, be added to the regular R.A.F. wherever they were most required. The Special Reserve, and also the Auxiliary Air Force, differ also from the regulars in that members of the two voluntary bodies, in practice if not in theory, belong permanently to their own squadrons, whereas the regular R.A.F. is on the same footing as the Navy, and officers and men are constantly transferred from squadron to squadron just as sailors serve now on one ship and then on another. The members of the Special Reserve and the Auxiliary Air Force resemble more the officers and men of the Army, who are permanently posted to one regiment or corps, and usually spend the whole of their service as a member of it. Association with regular officers and airmen both at work and in mess results in the Special Reserve personnel acquiring much of the outlook of the regulars and learning their methods of work. All ranks are very keen, and their keenness is directed into the best channels by the best instructors.

The Auxiliary Air Force is again a different organisation. It is on very much the same footing as the Territorial Army, and, like it, is in the care of County Associations. The officers and men are almost entirely volunteers, and in particular the commanding officer of each squadron is not a regular. Each squadron represents the voluntary effort of its own city or county. The R.A.F. provides the machines, aerodrome, and other equipment, and it also supplies two regular officers to act as adjutant and assistant adjutant, and also as flying instructors. These two must hold certificates as instructors from the Central Flying School, as they have to teach the new A.A.F. officers to fly. There is also a small nucleus of regular airmen in each squadron to act as instructors and to look after the machines on the days when it is impossible for the A.A.F. men to be present on the aerodrome. Each of these squadrons has its own ideals, and attains efficiency in its own way. The keenness of all ranks makes them very efficient, and they always perform with credit at the Hendon Display and in the annual Air Exercises held by A.D.G.B.

The Auxiliary Air Force squadrons are numbered from 600 upwards—*e.g.*, No. 601 (County of London) (Bomber) Squadron—and they have, like the Cadre squadrons, territorial names. Three of these squadrons are organised as two-seater fighters and the rest as light bombers.

There is much more which might be said about the R.A.F. A whole separate story could be told about the Commands which have no concern with A.D.G.B. The Air Force has to work with the Navy and the Army, and its work overseas is also a thing apart. For the present time of expansion the above outline tells what most people probably want to know.



The R.A.F. College at Cranwell, where cadets are trained for permanent commissions in the Royal Air Force. (*Flight* photograph.)

THE FOUR WINDS

ITEMS OF INTEREST FROM ALL QUARTERS

The Duke's Entry

The 1935 model Percival "Mew Gull" has been entered for the King's Cup Race by the Duke of Kent. Capt. Percival will, as in last year's race, fly the machine.

Believe It or Not

It is credibly reported that a Soviet factory is producing a glider which can be carried in a suitcase. It is made of rubberised fabric, and the structural members are inflatable tubes of this material!

Another Hungarian Picnic

The "air picnic" in Hungary which proved so popular last year is to be repeated next month. About thirty British machines are expected to take part in the excursion.

First Woman "D" Licensee

Miss Dorothy Spicer, who already has the "A," "B," and "C" licences, has gained her "D" (ground engineer's licence), thus becoming the only woman in the world to hold one.

In Miniature

Model aircraft enthusiasts are reminded that the Northern Heights Club's Gala Day takes place at Fairey's Aerodrome, Heath Row, next Sunday. The *Flight* Challenge Trophy is up for competition in the flying scale models class.

London—Blackpool on 6s.

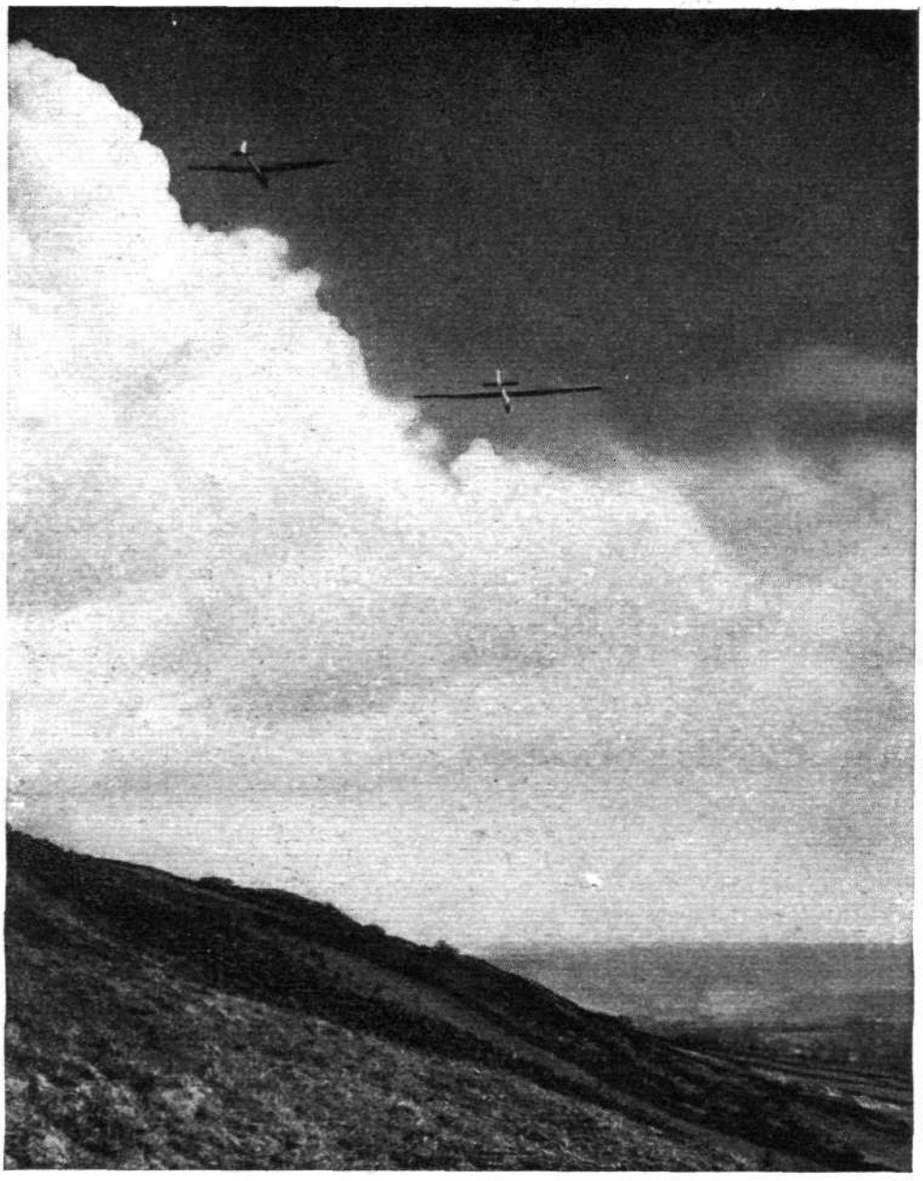
Flt. Lt. E. L. Mole, in a B.A.C. "Drone," flew from London to Blackpool last Friday, calling *en route* at Birmingham and Liverpool, in just under three hours. The fuel consumption for the 200-odd miles trip was 4 gallons, costing 6s.

On and On and On

A Fairchild "Ranger" engine (described in *Flight* of June 6) has, it is claimed, completed the equivalent of three years' operation (319 hours) without maintenance or adjustment of any kind. A similar type of engine with automatic lubrication of all parts is now on a 1,000-hour no-maintenance run.

The Pangborn Project

A special Burnelli in which Clyde Pangborn intends to encircle the globe non-stop in 4½ days is nearly completed. Pangborn will start his flight from San Diego, California, and will refuel over New York. Thence he will fly on *via* London to Rome, where the Burnelli's tanks will be replenished. More fuel will be taken on board over Karachi and the Philippines, and Pangborn hopes to fly home *via* Honolulu.



ON SILENT WINGS: A striking picture of the "Golden Wren" sailplane and a Rhon "Buzzard" soaring over Bradwell Edge, Derbyshire, which is proving an increasingly popular centre with Midland and Northern gliding enthusiasts.

Twenty-five Years Ago

From "Flight" of June 25, 1910.

"A feature of the race meeting held at Brooklands last Saturday was the auction sale held in the paddock, at which the rights to fly with Mr. Grahame-White as passengers were offered. Bidding was general up to 50 guineas, when a spirited contest ensued between Lady Abdy and Miss Pauline Chase. Eventually the hammer fell on Lady Abdy's offer of 120 guineas for the first trip."

Genuine

An Air France advertising announcement heard one evening last week in a Continental radio programme was preceded and followed by a most faithful recording of the noise of an aeroplane passing overhead.

Neatly Summed Up

"Mentality plays a greater part than physique. Too much imagination places unnecessary strain on the individual, while too little places unnecessary strain on the aircraft."—From Capt. Norman Macmillan's new book, *The Art of Flying*.

A Guide to the Royal Air Force Display will be found on pages 725 and 726.

NEW and EXPERIMENTAL TYPES at HENDON

Three General-purpose Aeroplanes, Three Bomber Transports, One Single-seater Fighter, One "Tailless" Two-seater Fighter, One Coastal Reconnaissance Machine, and One Amphibian Promised

FOR many years it has been customary to include as an "item" in the R.A.F. Display a park containing new and experimental types of aircraft, the majority of which take part in a fly-past. This year the number of new types likely to be shown is smaller than usual, being ten instead of the sixteen of 1934. In past years a percentage of the new machines in the aircraft park consisted of civil types. This year all the types, with one exception, are purely military aircraft, and even the exception can be classed as military, being a conversion from the original civil type into a Coastal Reconnaissance machine.

The "G. P." Machines

THE three General Purpose aeroplanes to be exhibited this year have all been designed to the specification known as G.4/31. The last figure indicates that the specification was drafted in 1931, so that the machines cannot be said to be entirely new in conception, whatever is the position with reference to their completion.

Handley Page H.P.47: In the aerodynamic design of this machine full use has been made of all such modern devices as can be expected to increase the efficiency. The wing has slots along the entire leading edge and slotted training-edge flaps extending from the wing roots to the ailerons, while power is added to the lateral control by placing interceptors, or "lift-spoilers," just behind the outer leading edge slots. In certain civil competition machines speed ranges in excess of 4:1 have been achieved. In the H.P.47 a large speed range has been attained, but it has been used to increase the top speed rather than to reduce the landing speed. In other words, the landing speed is the highest which is deemed advisable in an aeroplane of this type, and wing area has been reduced to give the highest possible maximum speed. The engine in this, as in the other three G.P. machines, is a Bristol "Pegasus III" nine-cylinder radial of 700 b.h.p. The H.P.47 was described in *Flight* of April 18, 1935.

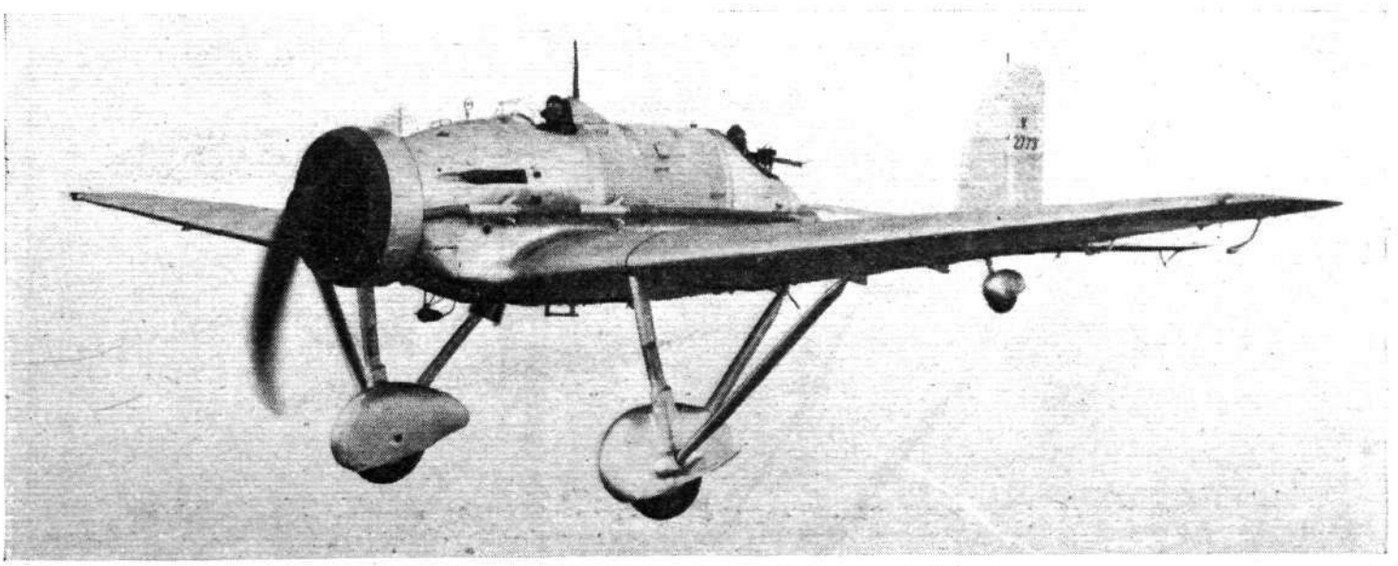
Hawker P.V.4: As the letters indicate, this machine has been designed as a "private venture," that is to say, it was not primarily produced to comply rigidly with any Air Ministry specification, although it does in fact meet all the requirements of the G.4/31 specification. In addition, however, this particular machine has been designed with specially high load factors, in order to make it strong enough to be used for dive-bombing. It will be obvious that an almost vertical dive from a great height, followed by a flattening out, imposes severe stresses on an aeroplane. These stresses the Hawker P.V.4 has been designed to withstand. In spite of this, the ratio of bare weight to gross weight is remarkably high, the machine carrying 93 per cent. of its own weight as disposable load. The span is 40ft. and the gross weight 6,650lb.

Vickers G.P. Biplane: Designed to perform the duties of a General Purpose aeroplane, or to be used as a day and night bomber or as a torpedo-carrier, this machine is a single-engined tractor biplane of all-metal construction, duralumin being the chief structural material. The pilot is placed ahead of the wings, and his cockpit is closed by a transparent roof. Handley Page slots and Frise ailerons are fitted. The undercarriage has Vickers oleo-pneumatic shock absorbers and Vickers wheel brakes. The wing span is 73ft. 7in., the length 38ft. 6in., and the gross weight 10,000lb.

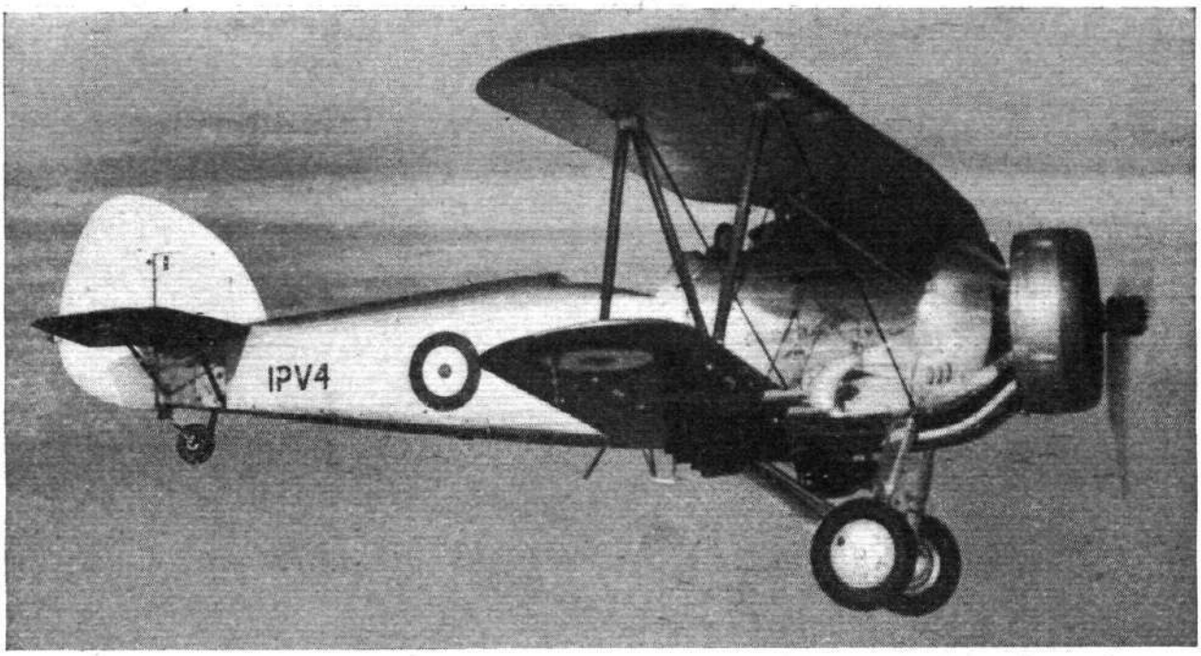
The Troop Carriers

THREE machines in this class have been "entered," but at the time of going to press it appears that one may be an absentee. Designed for carrying troops, machines in this class are to-day known as "bomber transports."

Armstrong-Whitworth A.W. 23: Designed and built by Sir W. G. Armstrong-Whitworth Aircraft, Ltd., the A.W.23 is a low-wing cantilever monoplane in which aerodynamic efficiency has been raised to a high degree of perfection. This has been achieved by suppressing all drag-producing excrescences, notably the undercarriage (which is retractable) and bombs (which are stowed inside the machine and not carried under the wings) There are enclosed turrets for front



The Handley Page H.P.47 General Purpose monoplane (700 h.p. Bristol "Pegasus" engine). (*Flight* photograph.)



The Hawker "P.V.4" General Purpose and Dive Bomber aeroplane. The engine is a 700 h.p. Bristol "Pegasus." (*Flight* photograph.)

and rear gunners, and the pilot's cockpit is totally enclosed. The machine can be used alternatively for the transport of troops and stores, as a heavy bomber, or as an ambulance. The engines fitted are two Siddeley "Tiger VI" fourteen-cylinder radials of 760-810 b.h.p. each, faired into the leading edge of the wing. The span is 88ft. and the length 80ft. 9in.

The Bristol Type 130: This is a twin-engined high-wing monoplane of all-metal construction, including the covering. The wings are fitted with split trailing edge flaps, hydraulically operated, and the fuselage is of metal *monocoque* construction. As will be seen from the photograph on the next page the machine is particularly "clean," and its lines are pleasing. When used as a bomber the 130 carries a crew of four. As a troop carrier it carries a crew of three and 24 fully-armed troops.

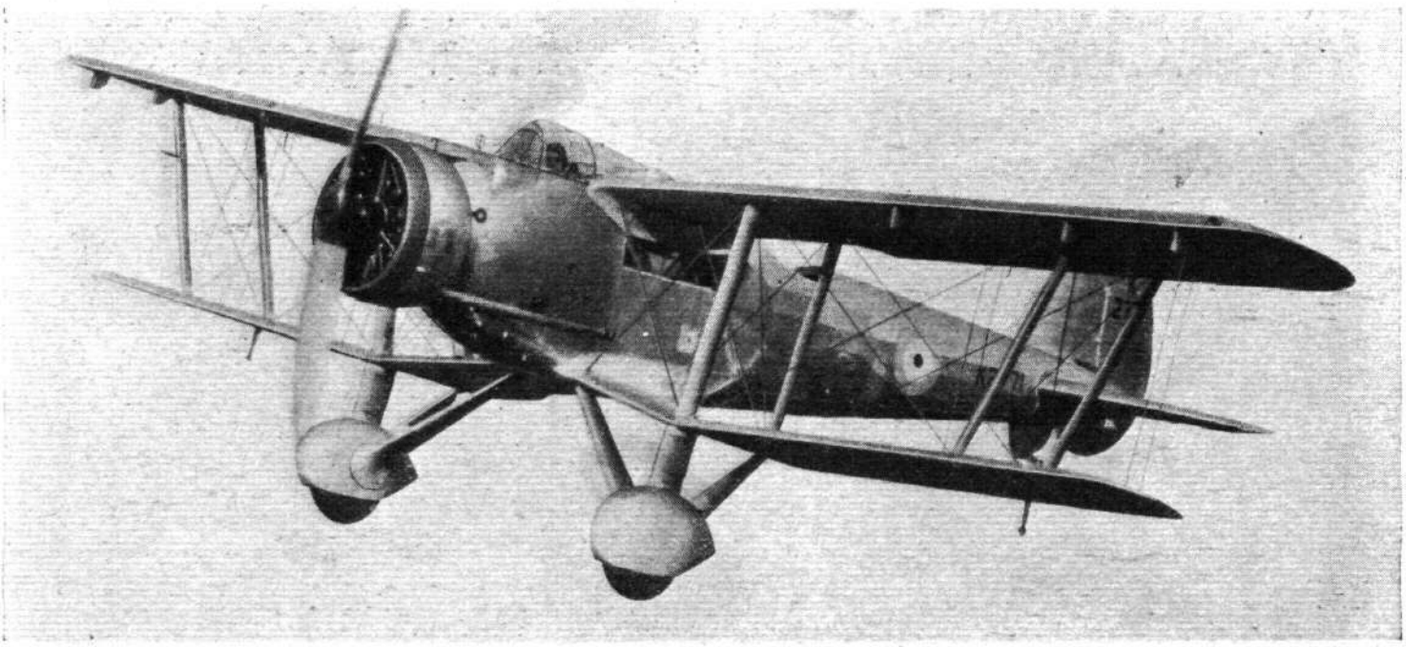
Two Bristol "Pegasus III M3" engines are neatly faired into the leading edge of the wing, and the wheels of the undercarriage are "spatted." With a wing span of 96ft. and an overall length of 67ft. 9in. the machine has a gross weight of 18,000lb.

Handley Page H.P.51: Like the Bristol machine, the Handley Page H.P.51 is a high-wing monoplane. As a troop carrier it has accommodation for thirty men, while as an ambulance it will take ten stretchers. The machine can also be used for transporting fuel. It then carries three petrol tanks of 173 gallons each. The tapered monoplane wing is fitted with wing-tip slots and slotted trailing-edge flaps. The wing span is 90ft. and the overall length 78ft. 4in. The two engines are Siddeley "Tiger VI," of 760-810 h.p. each.

Other Types

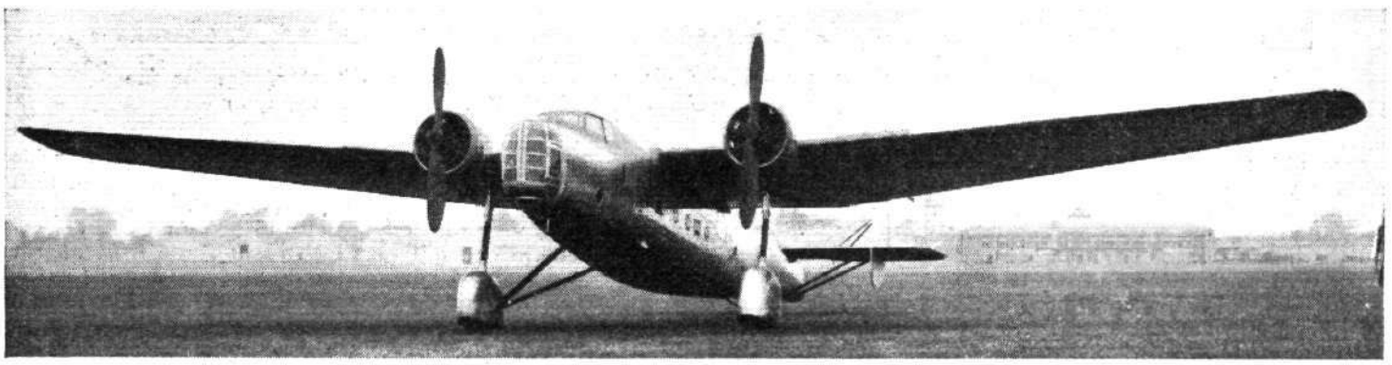
SEVERAL other machines are sole representatives of other classes, so can best be dealt with under one heading.

Gloster Day and Night Fighter: As sole representative at this year's R.A.F. Display of the day and night fighter class, produced to Air Ministry specification F.7/30, particular interest will attach to this Gloster machine. Designed and built by the producers of the "Gauntlet" single-seater fighter, which has a maximum speed of more than 230 m.p.h., the Gloster day and night fighter has to carry a considerably heavier load than is demanded of the "Gauntlet," yet it is believed that its performance bears comparison with that of the smaller machine. The engine is a Bristol "Mercury VI" nine-cylinder



Although seated in a commanding position, the pilot of the Vickers General Purpose biplane (700 h.p. Bristol "Pegasus") is well protected from the elements. (*Flight* photograph.)

A new Bomber Transport : The Armstrong Whitworth A.W.23, which has two 800 h.p. Siddeley "Tiger VI" engines.

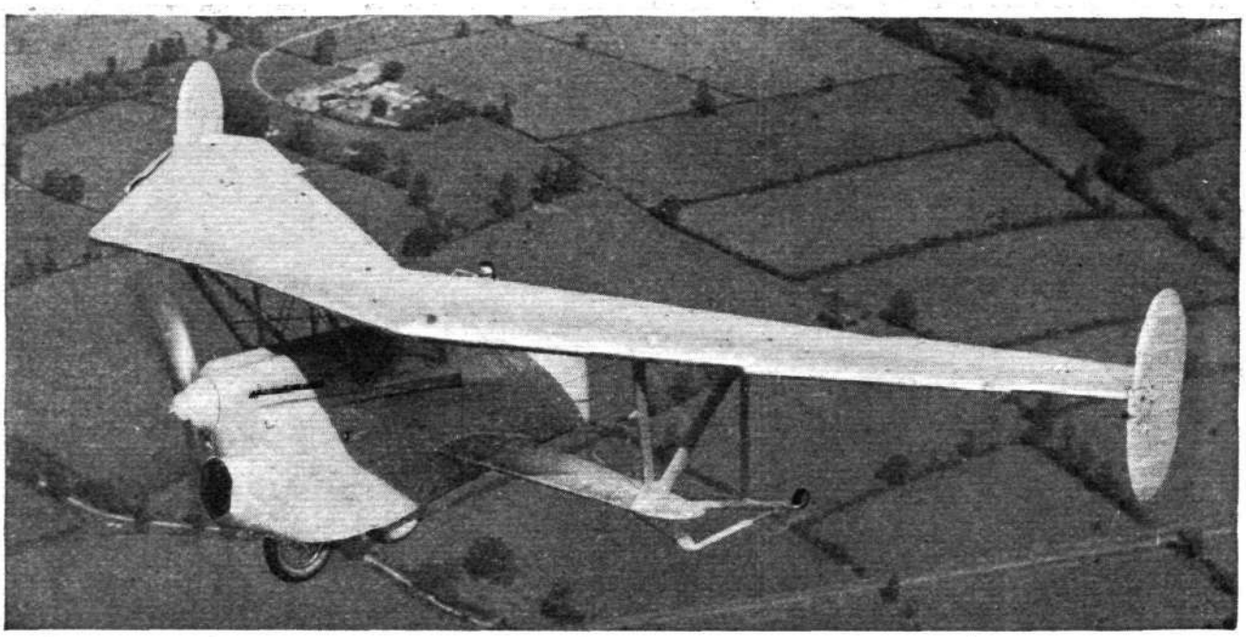


The Bristol Troop Carrier, unlike most modern machines, is a high-wing monoplane. The engines are Bristol "Pegasus" of 700 h.p. each.

radial supercharged engine, which develops 645 h.p. at 15,000ft. In its general lines the Gloster day and night fighter resembles the "Gauntlet," but it has a cantilever undercarriage.

Pterodactyl V: In this machine the "tail-less" principle has been applied for the first time to a military aeroplane. The "Pterodactyl V," designed by Capt G. T. R. Hill and built by the Westland Aircraft Works, is a two-seater fighter fitted with a Rolls-Royce "Goshawk" twelve-cylinder water-cooled engine which develops 650 h.p. at 15,000ft. The machine is virtually a 'sesquiplane" in that there is a diminutive lower wing which carries wing-tip skids for steadying the machine on the ground, the wheels of the undercarriage being placed in tandem and partly housed inside the abbreviated fuselage. Owing to the absence of a tail, the field of fire from the rear gunner's cockpit is amazingly wide and unobstructed.

The Gloster F.7/30 is a Day and Night Fighter with very high performance. Note the cantilever undercarriage. The engine is a Bristol "Mercury VI," which develops 645 h.p. at 15,000 ft. (*Flight* photograph.)



Tail-less: The Westland-Hill "Pterodactyl V" two-seater fighter affords unobstructed field of fire for the rear gunner. The engine is a Rolls-Royce "Goshawk" of 650 h.p. (*Flight* photograph.)

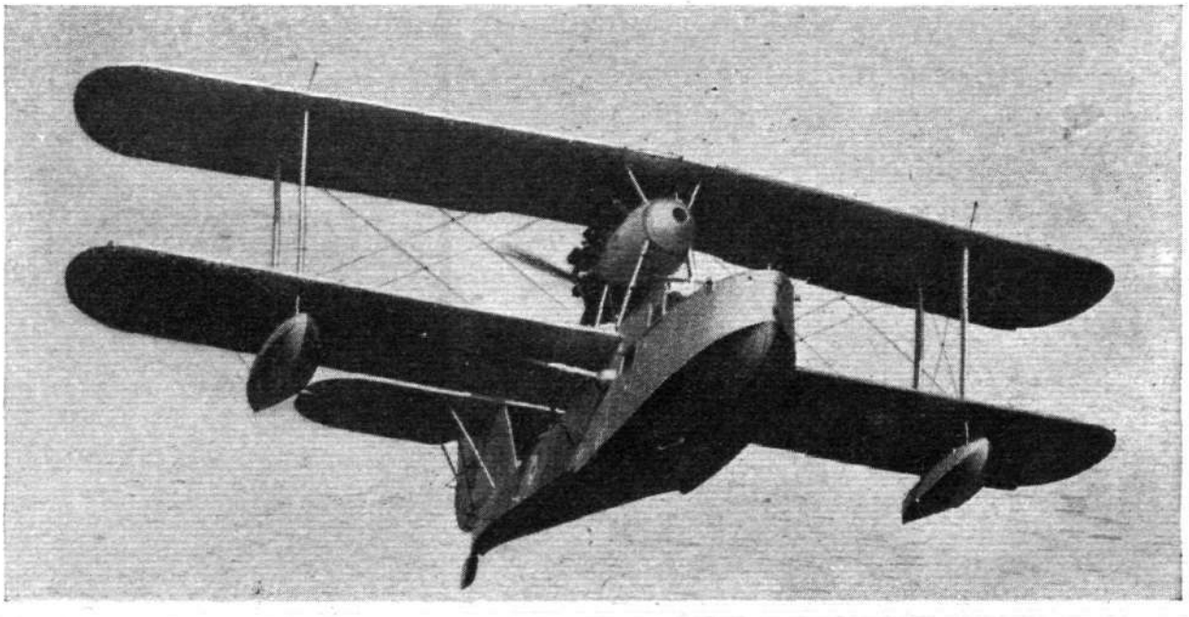
Avro 652 (Conversion): As its name implies, this is the military version of the Avro 652 commercial aeroplane, two of which were delivered to Imperial Airways a few weeks ago. The military version is used for Coastal Reconnaissance duties, and the internal accommodation differs, of course, from that of the civil machine. Otherwise no great changes have been made. The machine is a twin-engined low-wing monoplane, with retractable undercarriage. The two engines are Siddeley "Cheetah VI" radials, each developing 290 h.p. at 2,100 r.p.m. and 6,000ft. The wing span is 56ft. 6in., and the wing area 410sq ft. No performance figures may be quoted, but the civil version has a maximum speed of 195 m.p.h. and cruises at 165 m.p.h. It was described in detail in *Flight* of March 7, 1935. It may be assumed that the performance of the military machine is very similar.

The Supermarine Seagull V: This machine is an amphibian flying boat which has been ordered in considerable quantities for the Royal Australian Air Force, for the R.A.F., and for the Fleet Air Arm. The Fleet Air Arm version is to be known as the "Walrus." The "Seagull V" is a biplane flying boat of all-metal construction, driven by a Bristol 'Pegasus' engine mounted as a 'pusher.' There is crew accommodation for pilot, observer, navigator and W.T. operator. The land undercarriage is so designed that when the machine is operating over the sea the wheels are raised and disappear inside the lower wings. The amphibian gear can be detached in a very short time, and the military load is then increased by 350lb. The machine is designed also to be launched by catapult, so that here is a type which can operate from almost anywhere, including land, sea, the deck of an aircraft carrier, and launched from any vessel carrying a catapult, or from a catapult in a confined space ashore.

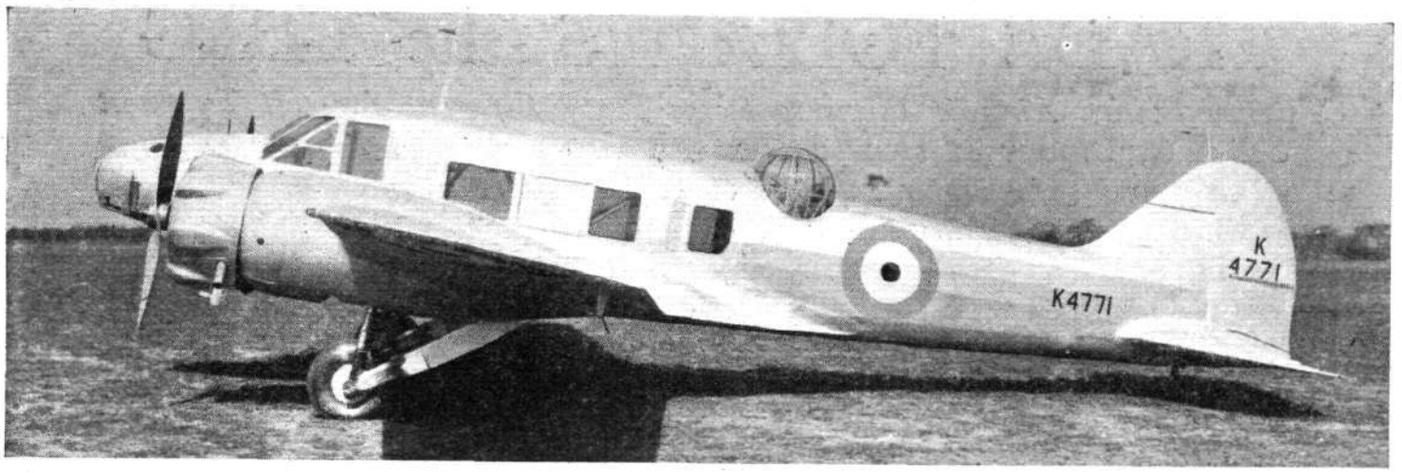
Two "Possibles"

In addition to the ten types mentioned above there is a possibility that the Handley Page "Heyford Mark II" may be included in the aircraft park. This new bomber is generally similar to the Mark I now in service in the R.A.F., but certain modifications have resulted in an improved performance. The pilot's cockpit has been enclosed, and a fairing extends from the top centre-section to the rear gunner's cockpit, affording him protection from the wind without increasing the drag of the machine. The installation of the two Rolls-Royce "Kestrel VI" engines is also slightly different.

It is known that the de Havilland "Comet" which won the air race to Australia last October will be seen at the Display. It may or may not be included among the new

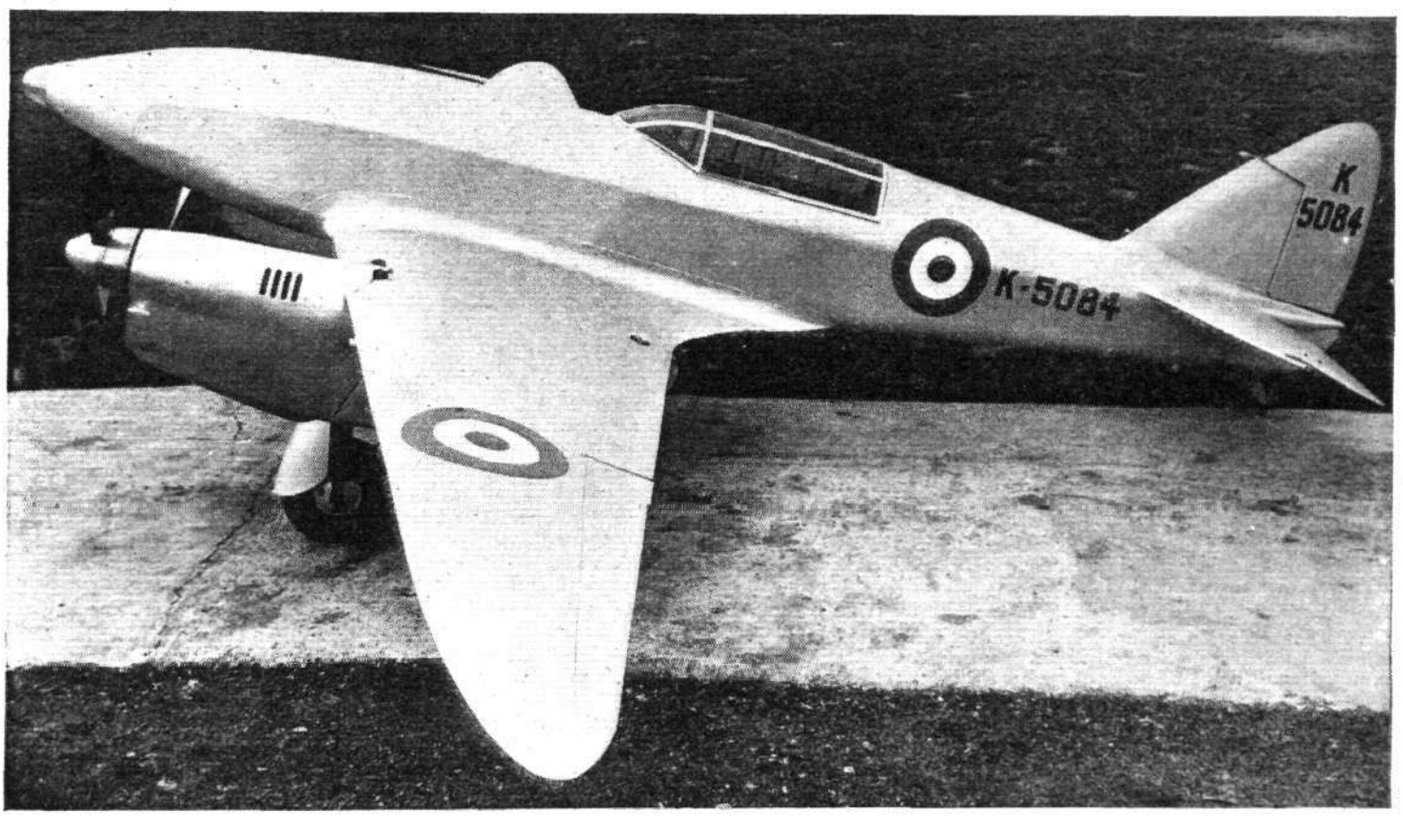


The Vickers-Supermarine 'Seagull V" pusher amphibian flying boat, with Bristol "Pegasus" engine. (*Flight* photograph.)



A Coastal Reconnaissance machine, the Avro 652 (Conversion) is the military version of the firm's commercial monoplane. It has two Siddeley "Cheetah VI." engines of 290 h.p. each.

machines in the aircraft park. This machine, a low-wing cantilever monoplane with two de Havilland "Gipsy Six R." engines of about 230 h.p. each, has been acquired by the Air Ministry for research purposes. Flown by C. W. A. Scott and T. Campbell Black in the Australia race, the machine has a maximum speed of about 230 m.p.h., and at Hendon there will be but one military type as fast—the Gloster "Gauntlet" single-seater fighter. The "Comet" is, of course, a two-seater.



The De Havilland "Comet" attains a speed of 230 m.p.h. with two 230 h.p. "Gipsy Six R" engines. This particular machine, which is now the property of the Air Ministry, was the actual Melbourne Race winner flown by Scott and Black.

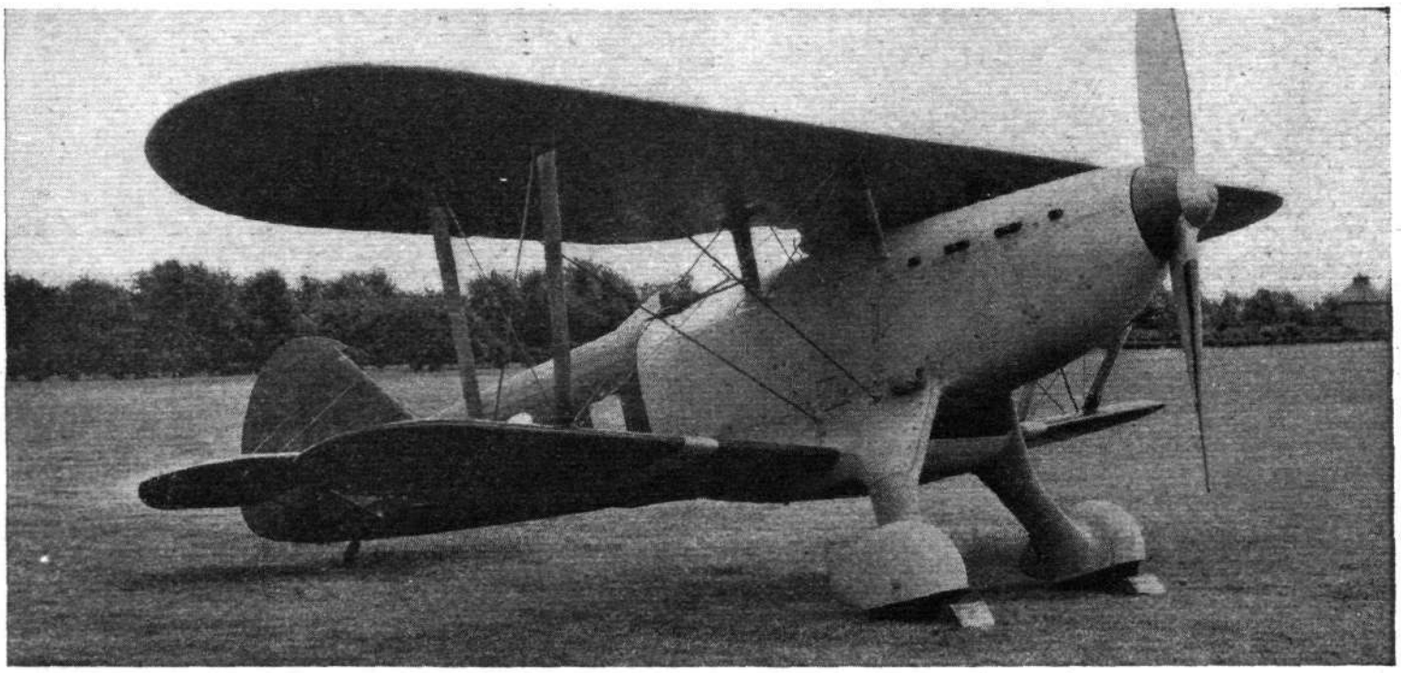
Forthcoming Events

Club Secretaries and others are invited to send particulars of important fixtures for inclusion in this list.

June 29. Royal Air Force Display, Hendon.
July 1. S.B.A.C. Display, Hendon.
July 6. Royal Air Force Fly-past before H.M. the King at Duxford.
July 7. Douze Heures D'Angers, Aero Club de France.
July 13. Opening of Leicester Municipal Airport.
July 20. Opening of Brighton, Hove and Worthing Municipal Airport, Shoreham.
July 20-21. *Coupe Armand Esders*, Aero Club de France.
July 26. Opening of Newcastle-upon-Tyne Municipal Airport.
July 27. London-Newcastle Race, Newcastle Aero Club.
July 28. Private Owners' Garden Party, Ratcliffe, Leicester.
Aug. 10-20. Second International Austrian Alpine Flight.
Aug. 17. Round the Isle of Wight Air Race and Portsmouth Air Trophy.
Aug. 24-25. Third International Flying Meeting, Lympne.
Aug. 24—Sept. 1. National Gliding Competition, Sutton Bank.
Aug. 24-25. Cinque Ports Club. International Flying Meeting and Wakefield Cup Race.
Aug. 24-30. Raduno del Littorio, Rome. Reale Aero Club d'Italia.
Sept. 4-18. Jungfraujoch Concours, Aero Club de Suisse.
Sept. 6-7. King's Cup Air Race.
Sept. 14. Cinque Ports Club. Folkestone Aero Trophy Race.
Sept. 15. Gordon Bennett Balloon Race, Warsaw.
Oct. 12-28. International Aircraft Exhibition, Milan.

TRADE FOLLOWS the FLAG

Twenty British Aircraft Firms to Show Forty Different Aircraft Types at S.B.A.C. Display at Hendon Next Monday : World's Fastest Single-seater Fighters to be Demonstrated



A fast fighter. The Fairey "Fantome" (860 h.p. Ycrs Hispano-Suiza engine) built for a single-seater fighter competition being held by the Belgian government. No performance figures are available, but one stipulation of the competition is that machines must be capable of at least 250 m.p.h. The armament includes four machine guns and the "cannon" which fires through the airscrew shaft.

WHEN the Society of British Aircraft Constructors decided to hold, in 1931, a combined display and exhibition at Hendon on the Monday after the Royal Air Force Display, the venture was very much of an experiment. Admission was by invitation only, and, as the general public was to be excluded, there was considerable doubt in many quarters as to whether such an affair would be "worth while." Actually, the display was a success.

This year the S.B.A.C. Display will be held at Hendon on Monday next, July 1, and some twenty firms have arranged to show approximately forty different types of aircraft, a number which speaks well for the versatility of the industry. In addition, the "static" exhibition, which will be housed in the large shed normally occupied by R.A.F. lorries, will be very much larger than ever before. Sixty-five firms, members of the S.B.A.C. and makers of aero engines, parts, materials, accessories and equipment, have taken space and will exhibit much that is of interest.

The "Static" Exhibition

For the first time, the general public will, this year, be admitted to the S.B.A.C. "static" exhibition during the Royal Air Force Display on Saturday, June 29, for the small fee of sixpence. Holders of tickets to the 10s. enclosure will be admitted to the exhibition during the afternoon of Saturday, and ticket holders from the other enclosures are to be admitted after the R.A.F. Display flying is over.

On Monday next Sir Robert McLean, chairman of the S.B.A.C., and members of the council of the society will receive the guests. The programme will open at 10.30 a.m. with a flying demonstration which will last until after 1 p.m. An official luncheon is timed to begin at 1.15 p.m., and after the luncheon Sir Robert will make a speech of welcome to the guests, and the afternoon will then be spent in inspecting the aeroplanes on the aerodrome and in visiting the static exhibition.

Next week's issue of *Flight* will contain a full report of the S.B.A.C. Display "static" and "dynamic," but in the meantime it may be of interest to mention quite briefly the aircraft which will be on view.

A single-engined "Courier" and a twin-engined "Envoy" will be shown by Airspeed, Ltd. The former, it may be remembered, was the first British aeroplane to have a retractable undercarriage, and the latter is one of the fastest small commercial aeroplanes.

Much interest will be attracted to the new Armstrong-Whitworth bomber transport machine, which will be seen in public for the first time at the R.A.F. Display on Saturday, and which is also to be shown on Monday next. A brief description of this machine will be found on p. 693.

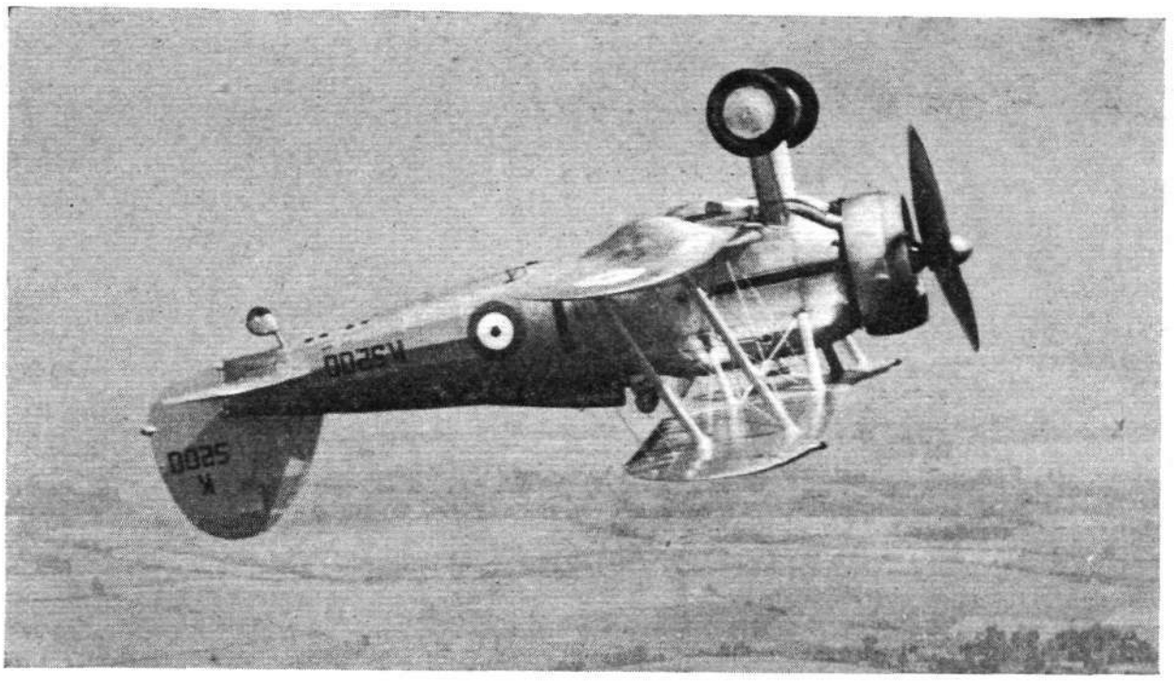
A single machine, the "Shark" General Purpose Coastal Protection type, will represent the Blackburn Aeroplane and Motor Co., Ltd. A detailed illustrated description of the "Shark" was published in *Flight* of December 13, 1934.

Two single-seater fighters will be demonstrated by the Bristol Aeroplane Co., Ltd. One of these is a "Bullpup" fitted with the Bristol "Aquila" sleeve-valve engine. This will be the first time this new engine is seen in flight. The other Bristol machine to be shown will be a "Bulldog" with "Mercury VI" engine, fitted with a variable-pitch airscrew. In this connection it may be mentioned that the "Mercury" is the first British aero engine to be proved out on type test for use with a V.P. airscrew.

The 1935 models of the B.A. "Eagle" and "Swallow" will both be at the S.B.A.C. Display. They are well known to readers of *Flight*, and the "Swallow" in particular is remarkable for the way in which it "hangs" in the air without going into a spin.

One of the largest individual exhibits of aircraft will be that of the De Havilland Aircraft Co., Ltd. The "star turn" from a spectacular point of view will undoubtedly be the flying, by Mr. Buckingham, of the "Comet." On the ground will be shown the D.H.89 Coastal Reconnaissance machine, a D.H.86, a standard D.H.89, and a "Leopard Moth," a "Tiger Moth" and the new "Hornet Moth." The latter will be seen for the first time in public.

Opposite ends of the scale will be represented by the two machines which the Fairey Aviation Co., Ltd., are showing. One of these will be the large "Hendon" night bomber, while the other will be the new single-seater fighter which this firm has designed and built for the Belgian fighter competition. This machine, known as the "Fantome," has a Hispano-Suiza



The Gloster "F.7/30" four-gun single-seater fighter (Bristol "Mercury") will be seen at the S.B.A.C. Display. It is here seen in inverted flight, piloted by Mr. P. E. G. Sayer. (*Flight* photograph.)

moteur-canon, firing through the airscrew hub, and, in addition, four machine guns. A stipulation in the competition regulations is that machines taking part must be capable of a speed of at least 250 m.p.h.!

General Aircraft, Ltd., will be represented by two twin-engined civil types, the S.T.12, which has two "Gipsy" engines, and the new S.T.25 "Jubilee" model, described on pp. 718 and 719 in this issue.

Fast aircraft will dominate the combined Gloster-Hawker exhibits. The Gloster four-gun fighter, designed to specification F.7/30, has a Bristol "Mercury" engine, while the Hawker "P.V.3," built to similar requirements, and also a four-gun fighter, has a Rolls-Royce "Goshawk" steam-cooled engine, and is believed to be even faster than the "Super Fury" produced a year or two ago. The second Hawker machine to be shown will be the "P.V.4" dive-bomber (photograph on p. 693).

Both the machines which Handley Page, Ltd., intend to show are military types. One will be the H.P.47 General Purpose monoplane, which is also to be seen at the R.A.F. Display, and the other the new "Heyford" Mark II.

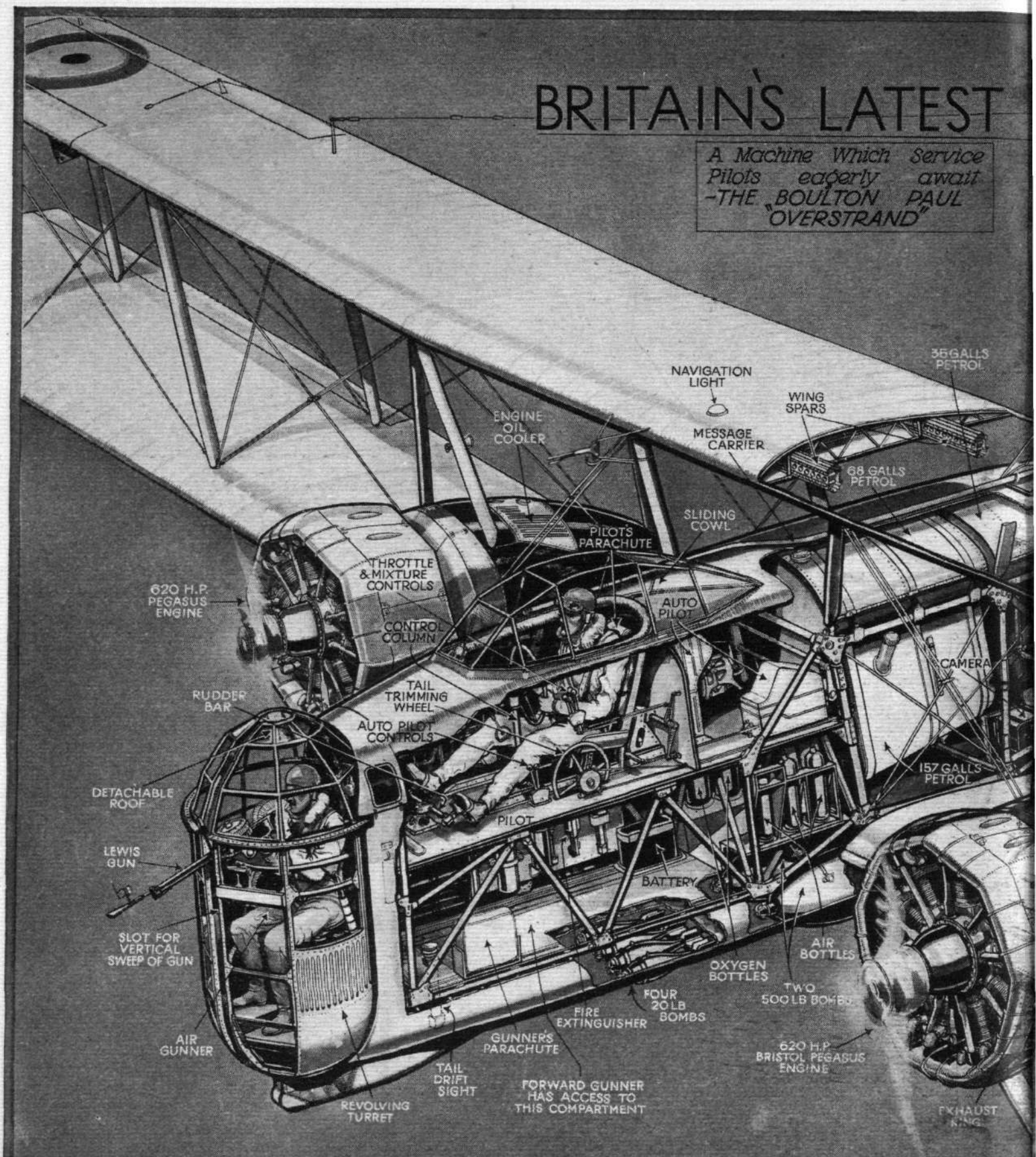
Capt. E. W. Percival will show the "Gull" (Gipsy Six) in which he recently flew from London to Africa and back in one day, and the 1935 model of the "Mew Gull" which the Duke of Kent has entered for the King's Cup Air Race.

A. V. Roe and Co., Ltd., will have the Coastal Reconnaissance, type 652A, possibly Imperial Airways' civil version of the same machine, a "Cadet," an Autogiro, and possibly a Type 626. An amphibian flying boat, the "Cloud," with Napier "Rapier" engines, will represent Saunders-Roe, while Short Brothers will show the "Scion" with Pobjoy engines.

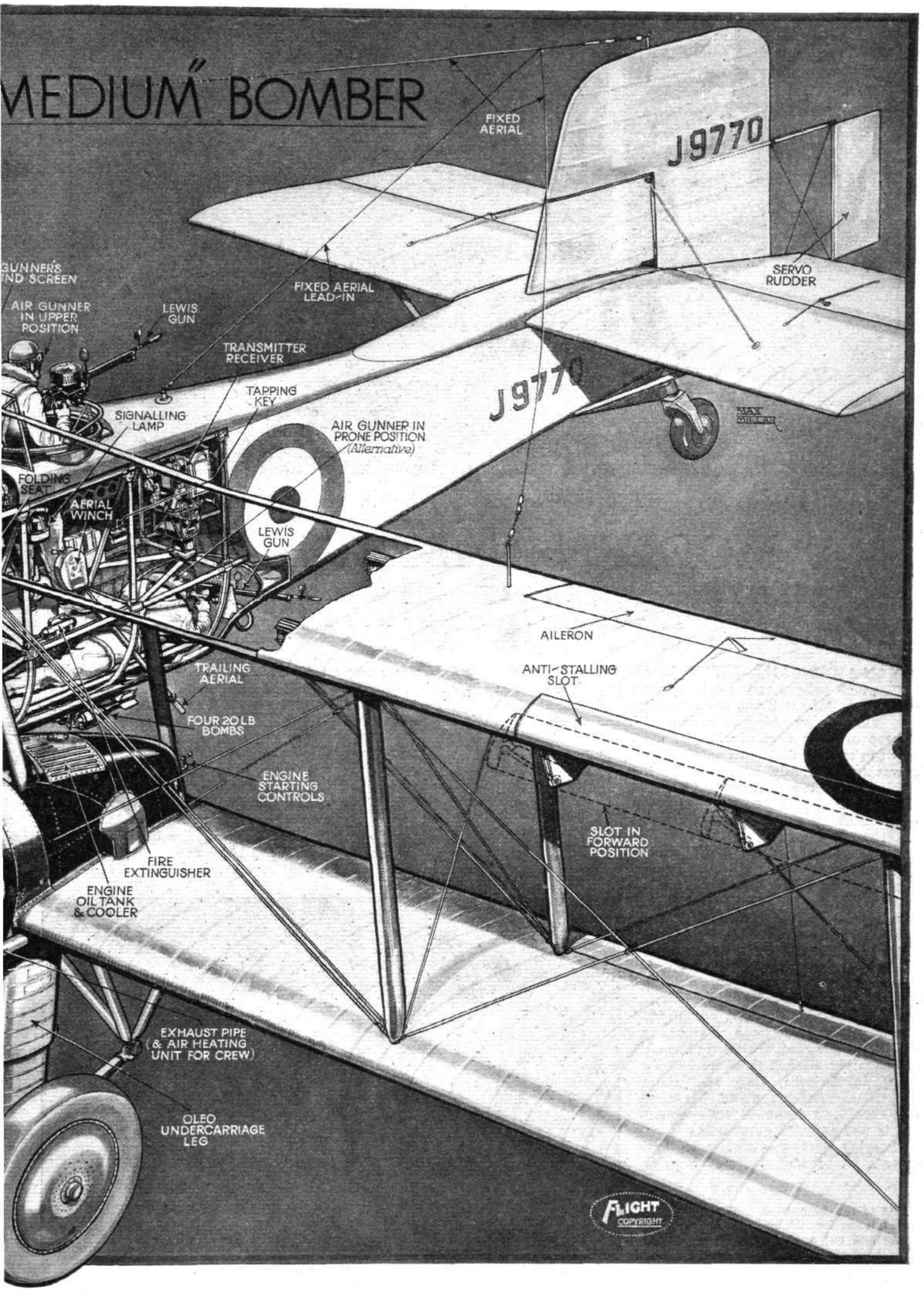
The Vickers-Supermarine group will have the same two machines as are to be at the R.A.F. Display, the "Seagull V" amphibian flying boat and the General Purpose biplane. There is, apparently, also a possibility of the new Vickers General Purpose monoplane being shown. This is a single-engined monoplane with retractable undercarriage and "Pegasus" engine.

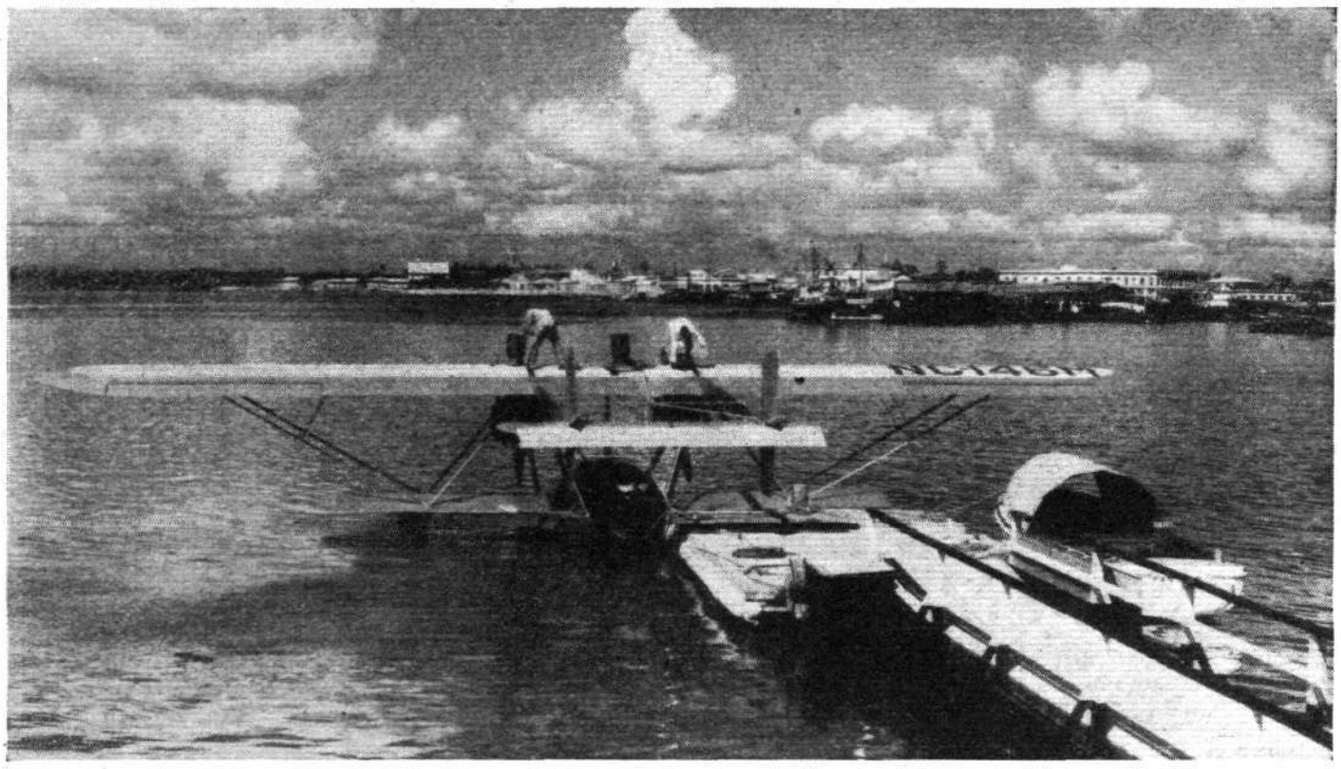
The Westland Aircraft Works have arranged to show the "Wallace" with the enclosed cockpit, and the tailless "Pterodactyl V." Only the former will be flown.

The new Hawker "P.V.3" is a four-gun single-seater fighter with Rolls-Royce "Goshawk" engine. Its performance is said to be "Schneiderish." (*Flight* photograph.)



This drawing, by Max Millar, shows the principal features of the "Overstrand", with which No. 101 (B) Squadron is now being equipped. It has two moderately supercharged Bristol "Pegasus" nine-cylinder radial engines giving a top speed of 152 m.p.h. at 5,000 ft. The service ceiling is 22,500 ft., and the machine is extremely manœuvrable


MEDIUM" BOMBER
FIXED AERIAL
J9770
GUNNER'S WIND SCREEN
AIR GUNNER IN UPPER POSITION
LEWIS GUN
FIXED AERIAL LEAD-IN
SERVO RUDDER
TRANSMITTER RECEIVER
TAPPING KEY
SIGNALLING LAMP
AIR GUNNER IN PRONE POSITION (Alternative)
FOLDING SEAT
AERIAL WINCH
LEWIS GUN
AILERON
TRAILING AERIAL
ANTI-STALLING SLOT
FOUR 20 LB BOMBS
ENGINE STARTING CONTROLS
SLOT IN FORWARD POSITION
FIRE EXTINGUISHER
ENGINE OIL TANK & COOLER
EXHAUST PIPE (& AIR HEATING UNIT FOR CREW)
OLEO UNDERCARRIAGE LEG
FLIGHT COPYRIGHT



A Sikorsky S.38 alongside a typical landing stage, at San Juan, Porto Rico. The tanks for both engines are being refuelled simultaneously.

A MODERN CARPETBAGGER

Part II : Sampling the Various Sea-going Aircraft Which Operate Between the Islands of the West Indies

By C. N. COLSON

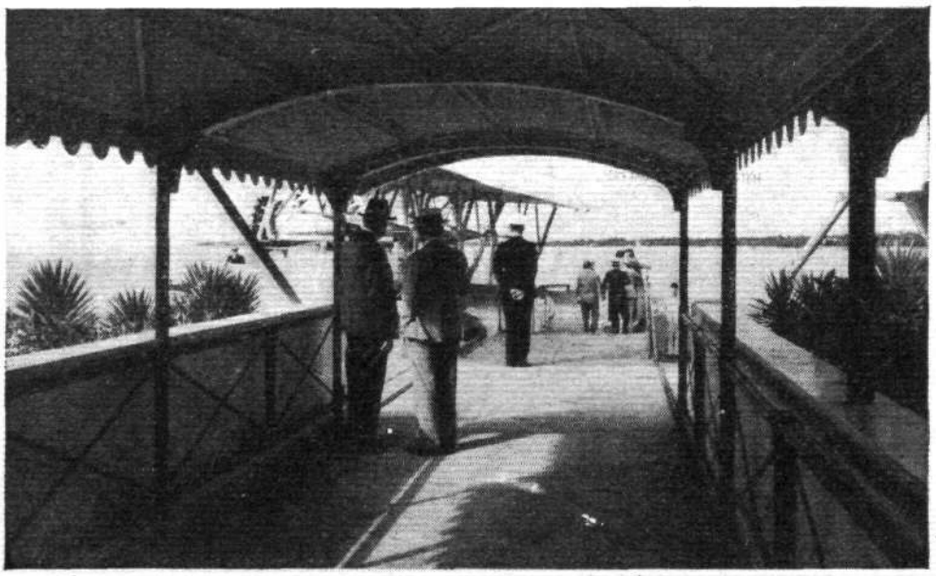
PAN AMERICAN AIRWAYS is one of those companies which believe in the old adage that "If you want a thing done well you must do it yourself," so they do almost everything connected with the overhaul and upkeep of their fleet of aircraft, even down to making their own wireless sets. I was tremendously impressed by the efficiency of their workshops, both at Miami and also at Brownsville, which is the base for the Western or Central American division.

In this article Lt. Comdr. Colson continues the story of the 16,000-mile aerial journey which he made round the United States, Central America and the West Indies in fourteen days in order to investigate American Commercial airline conditions on behalf of "Flight"

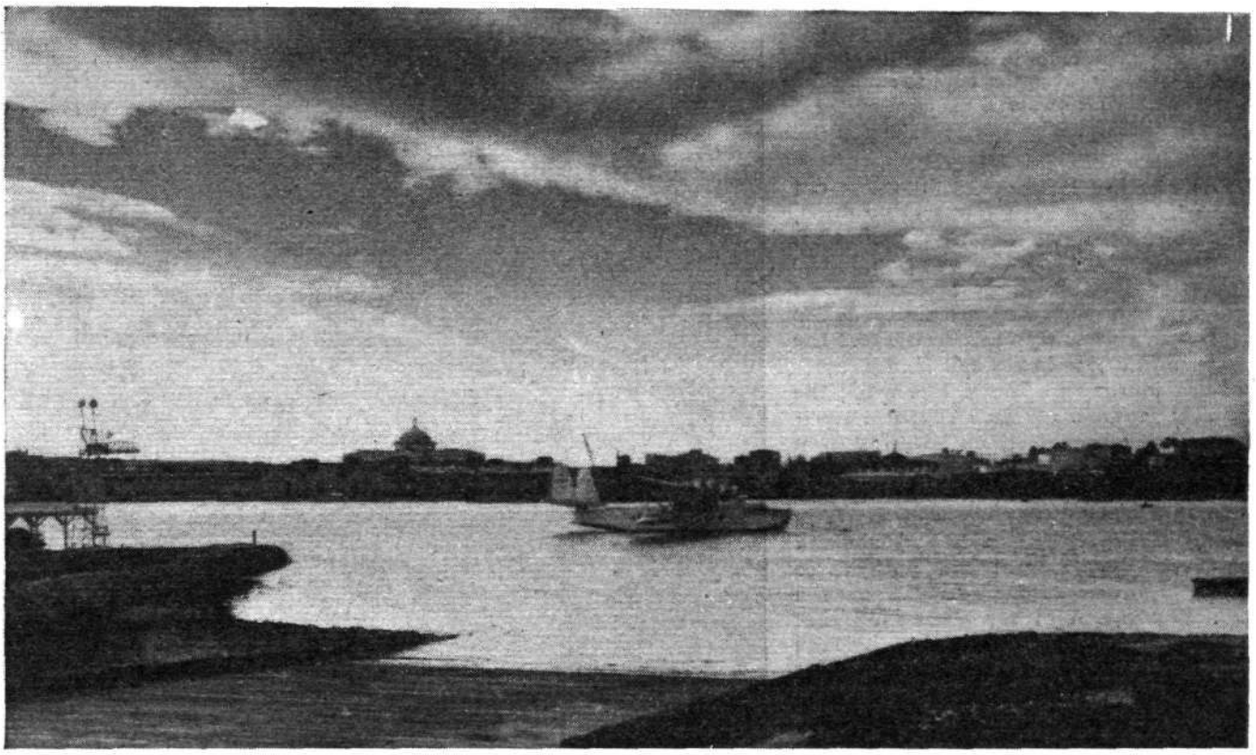
The next stage of my rapid journey was from Miami to San Juan, in Porto Rico, and back to Miami. I made this in the new large Sikorsky S.42. If one were to judge solely from the advertisements which have been sent all over the world—calling newspaper publicity advertisement for this purpose—one would probably come to the conclusion that the S.42 was an enormous boat which dwarfed all others. She is not really so large as all that: in fact, to our eyes, accustomed as we are to larger aircraft than are usually found in America, there is nothing particularly striking about her size. However, as a technical achievement she is undoubtedly outstanding.

Carrying thirty-two passengers and quite a lot of mail, for long hops in comfort and comparative silence, she would be bound to attract attention, even if she did not do it easily at 150 m.p.h., which is the cruising speed for the shorter journeys. Over the Pacific, the speed, for economy, is decreased to about 125 m.p.h. The most amazing thing about her is the way she leaps off the water, even with full load; I timed her at 14 sec. Pilots are loud in their praises of the way she handles, and everyone seems agreed that she is truly commercial, that is, a boat with which money can be earned.

Passing over, or skirting, Cuba, Haiti



One of the four "covered-ways" at Miami under which passengers get into and out of the flying boats. The roof of the way is extensible.



A storm about to break at San Juan, Porto Rico. The Pan American flying boats are drawn up the slipway in the foreground and housed in large hangars when necessary.

and Santo Domingo we saw a great deal of interest on the way to Porto Rico, even though such a large proportion of our route was actually over water.

We spent one night at Port-au-Prince, in Haiti, as the schedule to which we were working was still that in force for the slower flying boats, and because the S.42 was not yet working regularly on the route. Haiti savours of barbaric crudity, and now that the American Marines have left the republic to itself there is little to prevent the natives reverting to their African outlook on life and African customs. Sometimes, in the silence of the night, tom-toms can be heard in the distant hills, and then wise people do not enquire too closely into what is going on. Old "General" Christophe's castle is well worth a visit, but, unfortunately, we had only two or three hours of daylight after settling down in our hotel.

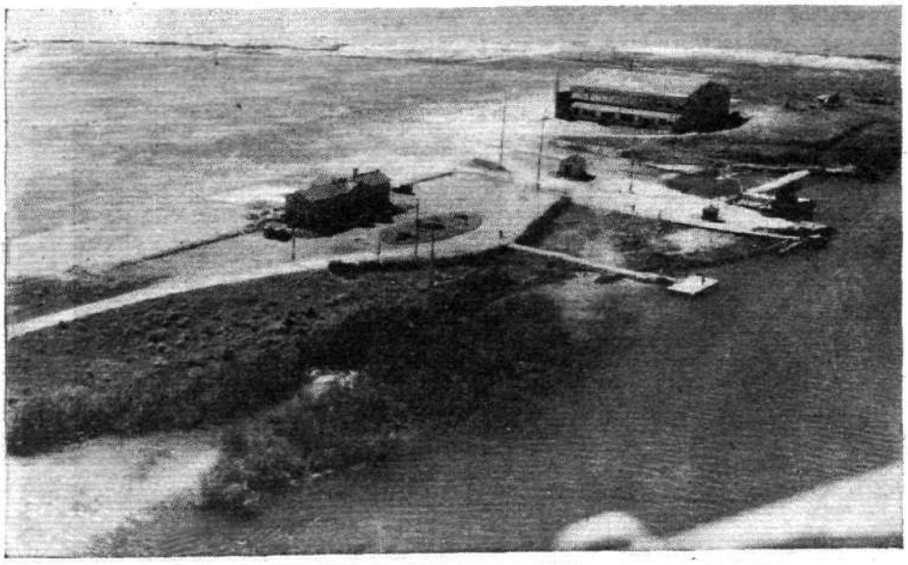
Pan American Airways do not look after their passengers in the Imperial Airways manner, that is to say, the passengers have to find their own way to hotels and so on. I was told that the travelling public in that part of the world prefer it, but it certainly gives one a great deal more trouble.

Next morning our flight was quite uneventful—over high mountains, for the most part in clouds, between Haiti and Santo Domingo; a landing at San Pedro de Macoris; and a rapid disembarkation at San Juan, in Porto Rico, before a terrific storm burst. It wasn't really terrific. Just the beginning of the rainy season and nothing for the indigenes to write home about, but I was glad we weren't flying through it.

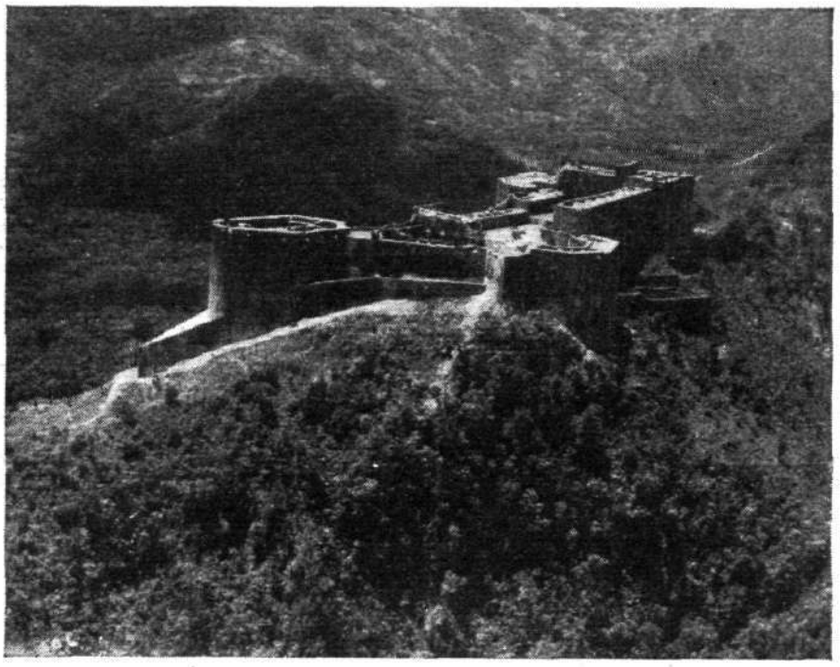
San Juan is a lot more civilised than the other places. The island is run by the Americans—mostly American Marines, I was told—and the negro population has, in the towns, been very much mixed with Spanish blood; the result is that a large proportion of the women are really beautiful, with Spanish features, and very different from the negroid type in Haiti, which has lost most of its French influence.

It seemed a wicked waste of opportunity to visit all these different countries without staying even a day in each so that I might have got a fairly sound idea of what each was like, but my job was to see the air lines rather than the countries, and on I had to go.

At most of the ports in which we landed, the method of embarking and disembarking was the same. At the end of a pier a floating stage or pontoon was moored. When the boat landed a small boat came out and paid out, across our bows, a line with corks on it; one of our crew was thus able to get hold of the line and make it



An aerial view of the landing stage and aerodrome at San Juan, Porto Rico. An S.40 is alongside the stage.



"General" Christophe's Citadel in Haiti. It was from here that, so it is said, he used to make soldiers march over the edge to show off his power.

fast. Then another boat generally came out and made a line fast to our stern, and by these, sometimes stern first and sometimes bow first, we were pulled alongside the pontoon. The whole operation did not usually take more than a few minutes, and when we were alongside the passengers were able to step ashore without the inconvenience of a ride in a small boat.

Our return journey to Miami was made the next day in the same machine. It meant starting after an early breakfast, no hardship even for sleepy-headed Europeans in the delightful climate they have out there, and although we landed at the same places we were back in Miami long before dark. We had a bank manager's young wife on board with three small children, a combination which gave a very good illustration of my contention that travelling by air is much simpler than by land or even water. Her journey certainly wasn't a picnic—no journey with three small children could be!—but she arrived at Miami considerably less worn out than if she had made the long and tedious boat trip, despite being alone with her "troubles."

Miami—where the men never wear coats—was pleasantly hot that night, and after flying all day it was restful to have dinner in a coconut grove, where the only disturbance to peace was the whirring of innumerable cicadas.

Miami is no place in which to try to get any food early in the morning. The thing to do is get out to Dinner Key, whence the Pan American boats leave, and get what you want before you sail, at the restaurant above the station building. In the hall there is an enormous revolving globe with the world's air routes—or most of them—marked on it; and if this is not enough to keep you interested while you wait for the U.S. postal authorities to get the mail ready so that you can leave, if you are lucky, not more than half an hour behind schedule, you can study the walls and ceiling, on which is painted much of the history of flight.

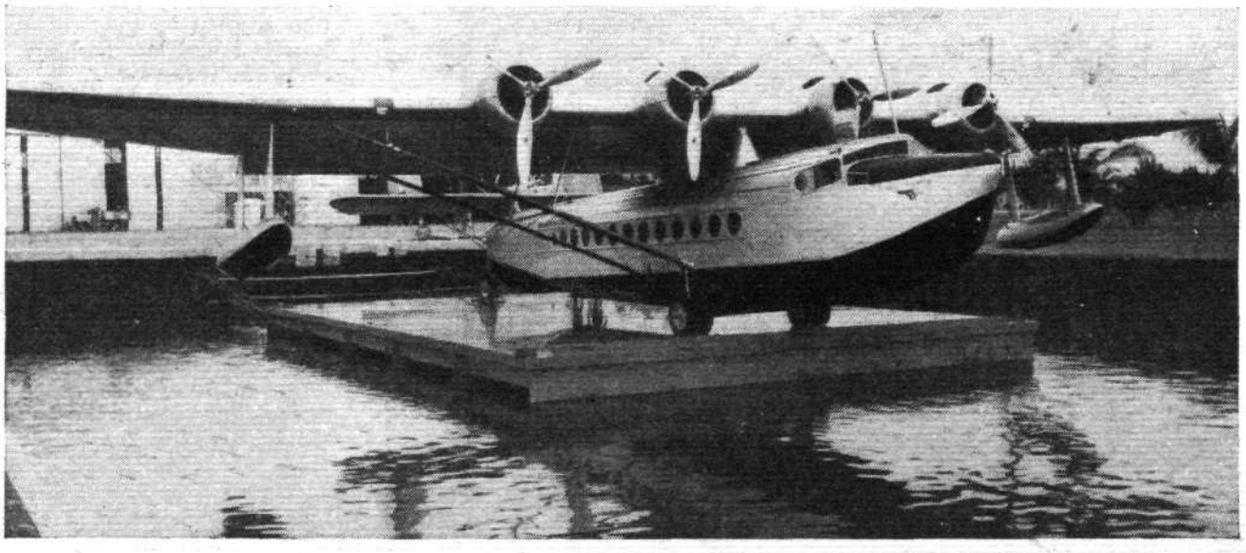
From now on, as far as the over-water part of the journey was concerned, I had to be resigned to noise, and lots of it. The S.40 and the Consolidated "Commodore," good as they were in their day, are no longer to be compared with boats like our own Short "Kent" class or the S.42, but they have done their work well, and before very long will presumably be put out to graze behind some convenient hangar along with some S.38's which I saw at one aerodrome. There ought to be a better way of disposing of trusty old aircraft—they look rather pathetic, like worn-out circus horses which no one has the heart to kill off.

Actually the S.40 still has a fine performance as regards load carried and can, if necessary, accommodate forty passengers. We stopped first at Havana, but didn't see any signs of "shootings-up" or other excitement. I understand that a good deal of trouble is caused by the fact that the Cuban Government steadfastly refuses to allow the pilot of the Pan American boat which took Machado out of the country to fly on any service which touches Havana. If they get him they are going to . . . well, what they say and what they'll do may be two different things!

Right over Cuba, with its well-cultivated areas where tobacco, pineapples, sugar, coconuts and fruits are grown, we flew until we came to the other side, where the country is very desolate and unprepossessing in appearance.

Stopping at Cienfuegos, we refuelled before continuing down nearly parallel to the coast over numberless coral reefs and cays with high-sounding, religious sort of names.

(To be continued.)



The S.42 at Miami. The rails on which this platform is raised can be seen; a few moments later the platform was level with the quay and the S.42 was pulled off into the hangar by a small motor tractor.

THE SNAG HUNTERS

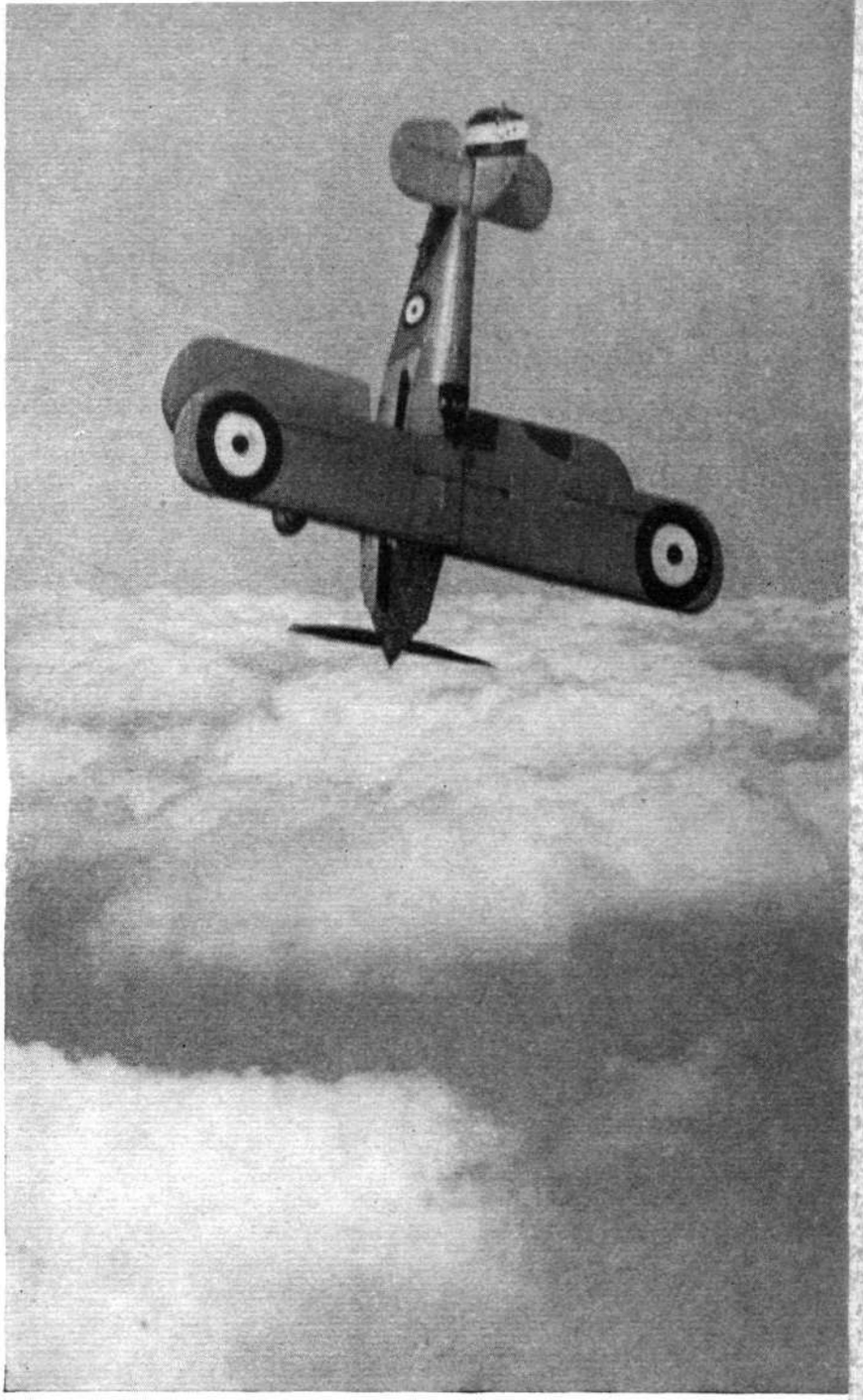
How Service Aircraft are Tested : Some Details of the Searching Examination to which Test Pilots Subject Their Charges

By H. F. KING

IT is doubtful if the most air-minded visitor to Hendon, as he follows the manœuvres of the 230 m.p.h. fighters and watches the stately progress of the dark green bombers and great silvery flying boats, comprehends how these magnificent aeroplanes, and the great variety of other types employed by the Service, are tested, improved, and perfected preparatory to their adoption as standard equipment. Possibly, also, he is unaware of the magnitude of the part played by test pilots in assisting the designer and engineer, for, generally, loquacity is conspicuous by its absence from the demeanour of these gentlemen.

So we will follow the trials to which a British military aeroplane is subjected from the time the dope is scarcely dry on its fabric or, to be completely modern and comprehensive, the last rivet is driven home in its skin.

Every aeroplane intended for service in the Royal Air Force is constructed either to a specification issued by the Air Ministry—in which case it is likely to be matched in competitive trials against machines built to meet the same requirements—or it is produced as a "private venture." In the latter case the manufacturer is, so to speak, submitting a machine "off his own bat" in the hope that, although it does not fulfil all the conditions imposed by a specification, it will be adopted on other merits.



The Plummet : A "Nimrod" fleet fighter enters a terminal velocity dive in which it will reach a speed in the region of 400 m.p.h. (*Flight* photograph.)

In either instance the aircraft is put through a series of rigorous tests. On its completion it undergoes trials in the hands of its manufacturer's test pilot; they are known officially, if the machine is built to the order of the Air Ministry, as "contractor's trials." These being completed, it is delivered to the Aeroplane and Armament Experimental Establishment, Martlesham Heath, Suffolk (or, should it be a flying boat, seaplane, or amphibian, to the Marine Aircraft Experimental Establishment at Felixstowe in the same county), where its performance is determined and its handling, fighting, and maintenance qualities noted. Farnborough, a third experimental establishment, deals with engines, aerodynamic design, and such items as catapults and wireless. Finally, prior to its adoption as standard equipment, the machine is sent to an R.A.F. unit for subjection to everyday usage under Service conditions, and is reported upon by R.A.F. personnel. Fleet aircraft are actually "Service-tested" on an aircraft carrier, or, if designed for catapult work, possibly from a warship suitably equipped. If any major modifications are found desirable after a machine has been adopted it is submitted once more, in its revised form, to Martlesham.

Let us suppose that a brand-new prototype military aeroplane has been completed and passed "ready for flight" at the constructor's aerodrome to be put through manufacturer's flight trials by the test pilot. There has, of course, been close co-operation between the contractor and the Air Ministry through the medium of the Resident Technical Officer and the A.I.D. inspector, and, in all probability, between the chief designer and test pilot, for the knowledge accumulated by this latter during the tests of previous Service types may prove of the greatest value in the planning of a new design.

Such items as seat, control and instrument positions, and view and windscreening, receive the blessing of the pilot, and the machine is ballasted to give a midway position of the c.g.

Then the engine is started. Onlookers and the pilot endeavour to detect vibration, not only of the mounting, but of the whole airframe. The pilot ensures that the throttle movement meets with his approval, for it is possible that the engine "opens up" or "shuts down" too rapidly. In addition he notes the boost pressure—for the engine, most likely, is supercharged—the r.p.m. and the pressures of oil and fuel; the ignition is tested on each switch, and the individual fuel systems are brought into operation to determine that they operate efficiently.

Everything is now ready for taxying tests, the pilot

having ascertained the position, both vertically and longitudinally, of the centre of gravity. Chocks are pulled away and the machine is run round the aerodrome to test the suitability of the undercarriage, brakes, and skid or tail wheel. A special watch is kept for pitching and swinging; steering at low speeds may prove difficult and, when the throttle is opened, torque or slipstream may exhibit peculiarities for which remedies must subsequently be sought. The pilot's handling of the machine on the ground becomes increasingly rough, and he subjects it to severe bumping (by picking out a portion of the aerodrome where the surface is bad) and turning. Often, as a result of these taxying tests, a pilot can prophesy any serious vice which the machine is likely to exhibit when taken into the air; this may then be nipped in the bud. On returning to the hangars a detailed inspection is made and, perhaps, detail modifications are called for before the aeroplane first leaves the ground.

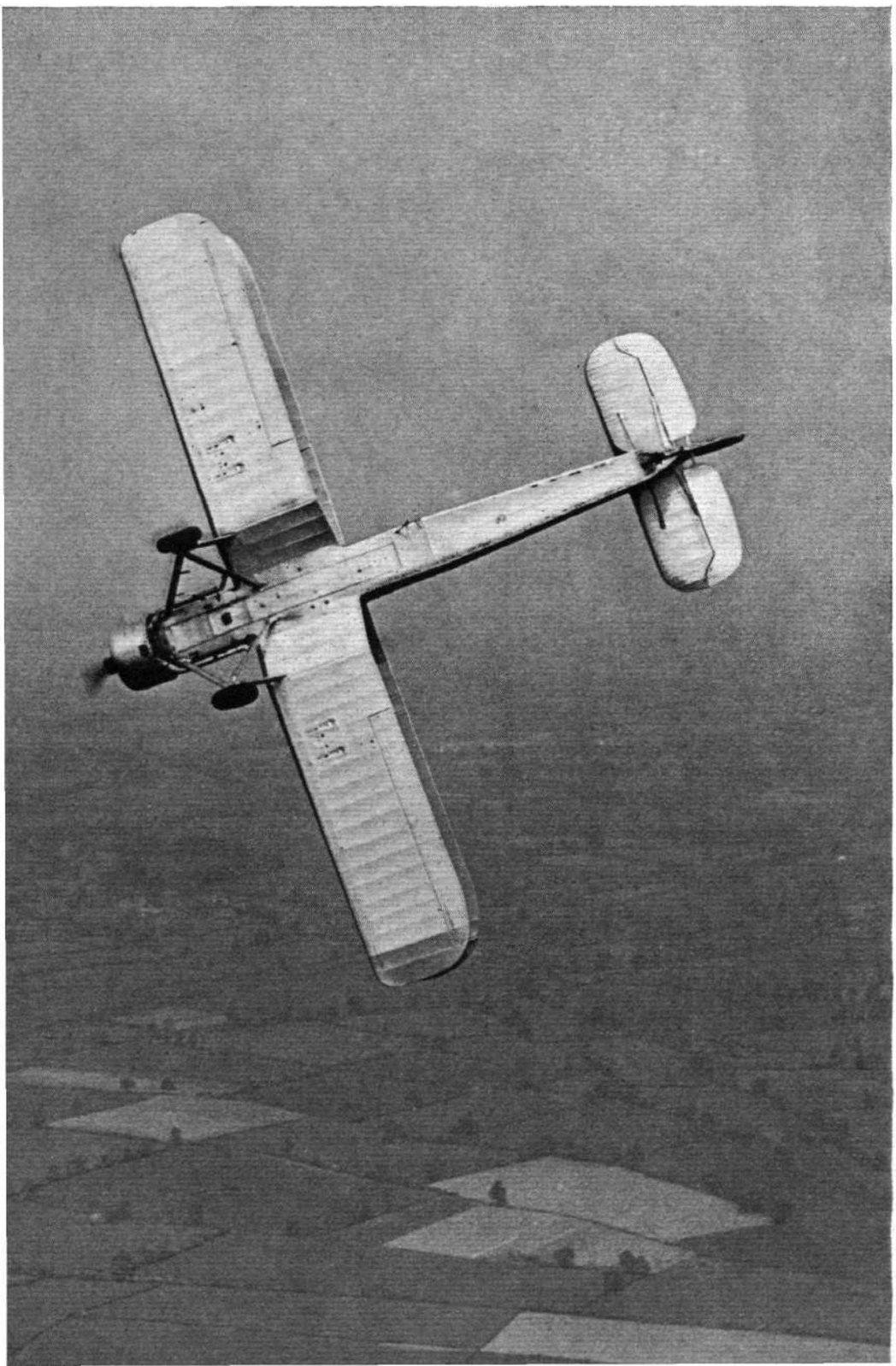
During the initial tests of seaplanes and flying boats such items as the position of the water line and the stability, riding, airscrew clearance and control on the water must be noted.

Now the machine goes out to make its first take-off. At the extreme down-wind end of the aerodrome, with the tail trimming gear in "half way" position, the throttle is eased forward and the tail lifts clear of the ground as the machine runs over the aerodrome. In this attitude it is possible for the pilot to feel each control before he lifts the machine off and climbs gradually. It is useful, on the first flight, to throttle back at a safe height and determine the approximate stalling speed, as this will assist in making the first landing, although it is not advisable to stall the machine, as the controls cannot yet be guaranteed to stop a spin.

Serious testing of new types is done between 10,000 and 15,000 ft. Turns, of increasing tightness, are made to right and left to test the effectiveness and harmony of the controls: any vibration is noted and longitudinal stability with engine on and off is tested. Possibly the aircraft will respond well to one or two controls, but not to the third, showing that the three are not harmonised, so after the first landing, which, made of course, in a respectful manner, the surfaces may be modified, a larger rudder fitted, or the span of the ailerons increased.

The days when wings and tails were in the habit of parting company with the fuselage (one test pilot just could not make up his mind which part to remain with) are passed. It is not uncommon for a test pilot to stunt a machine on the first flight he makes in it, probably more from exhilaration than any desire to show off. After the completion of the first flight a conference is held between the pilot, designer, and chief engineer, and other interested parties, and the desirability of modifications discussed. Should any be made, the machine, in its new form, is tested "light" once more and then loaded, usually with ballast, to its gross weight.

Figures are taken for the machine with variations in external drag. For example, a light bomber will probably be tested carrying, say,



An Armstrong Whitworth general-purpose biplane shows her mettle during handling tests. (*Flight* photograph.)

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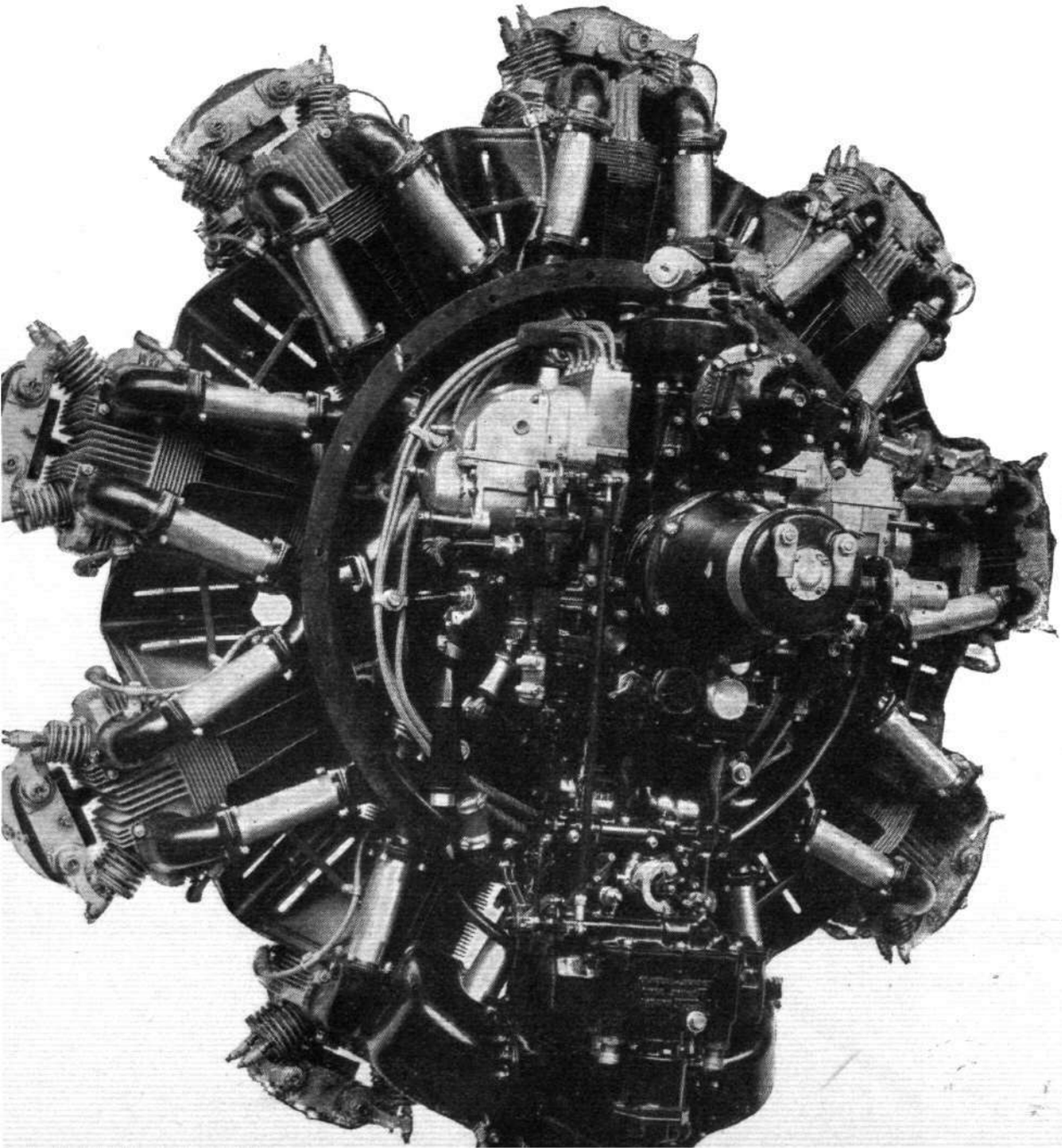

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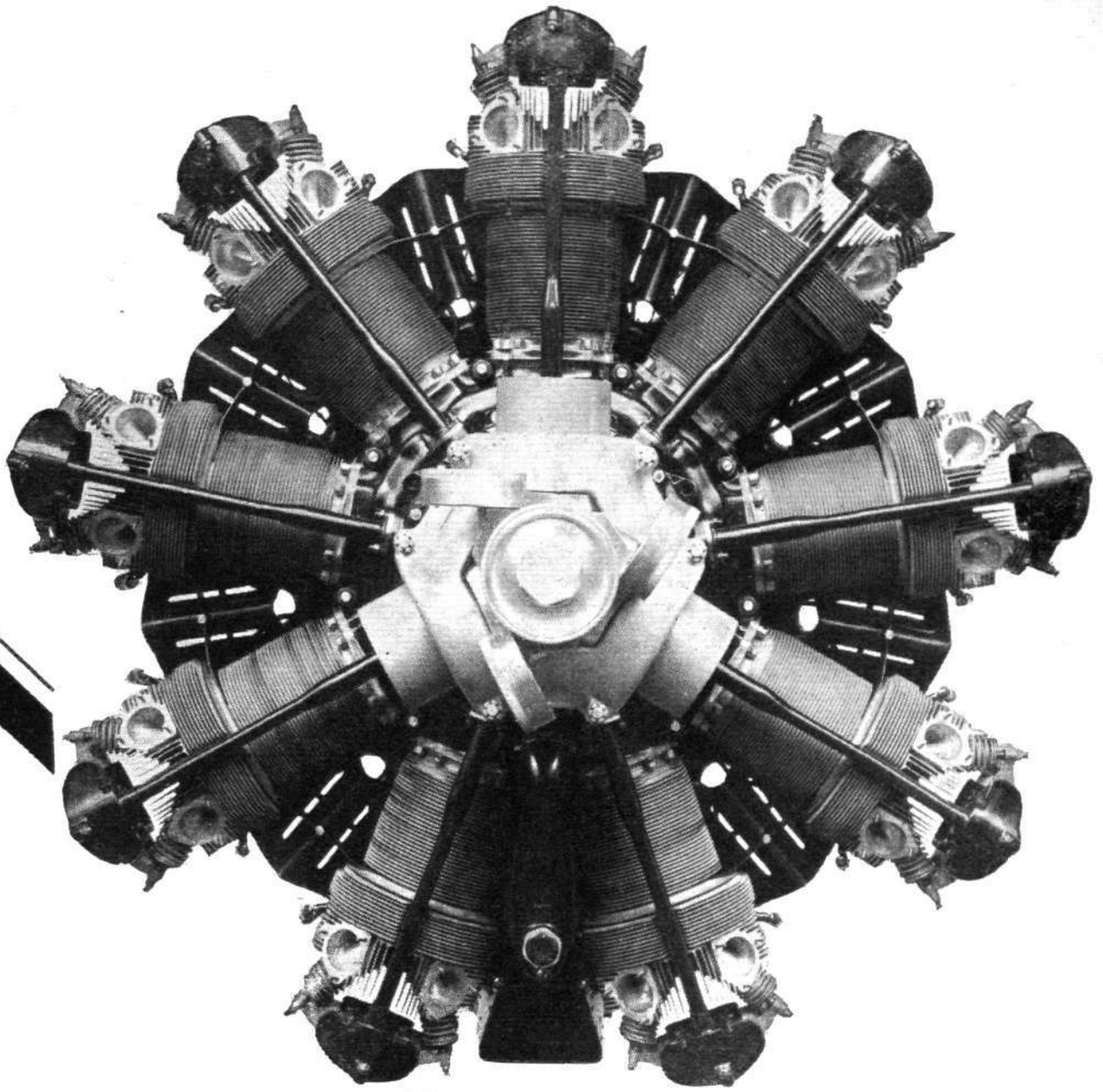

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itures incorporated in the engine and contributing to the kable power-for-weight ratio include a lightened reduction ar, the standardisation of the Hamilton controllable pitch airscrew together with integral oil valve for its control; new and improved cylinder with substantially increased finning; strengthened connecting rods made in a new and improved material; improved master-rod floating bush bearing; modified and improved blower; sodium-cooled and stellited exhaust valves and stellited valve seats; new interchangeable cone mounting with rubber shock damping attachment; and new combined cowling and exhaust ring of riveted stainless steel construction mounted on rubber.

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DE HAVILLAND AIRCRAFT COMPANY LTD., HATFIELD AERODROME, HERTFORDSHIRE, ENGLAND

four 112-lb. bombs and two 250-lb. projectiles. In certain tests, which could be called qualitative rather than quantitative, the fitting of external items which might affect the handling qualities is essential. A navigation light, for example, would, perhaps, cause tail flutter, or the head and shoulders of an observer might set up eddies during a high-speed dive, with similar results. Ballast is used in spinning and diving tests, but an observer is carried during handling trials.

The trials made by the firm's pilot preparatory to delivery for official test are, in the main, similar to those to which the aircraft is subjected on its arrival, so a description of the latter should suffice. In all probability the machine is flown to Martlesham, assuming that it is a landplane, by the firm's test pilot, and it is likely that immediately on arrival it will be weighed with the crew and equipment in position. The centre of gravity can be estimated from the weights on wheels and tail skid, and this may be compared with the results of the official c.g. determination, thus providing data of use to the pilot who puts the machine through its first handling tests. Subsequently, the "drained" or "light" weight (taken when the aircraft is stripped of all equipment, and the fuel and oil tanks are empty) is measured, the tare c.g. ascertained, and the aircraft weighed with its tanks full. The capacity of these latter can, as a result, be checked.

During all its tests the aircraft is accompanied by a list giving the weights of "fixed" and "movable" equipment. In the former category are the parts of the machine which, although not integral, are essential to its safe operation; these include, of course, the instruments. "Removable" items might actually be classed as military equipment—torpedoes or bombs with their racks and releases, guns and ammunition, wireless equipment, cameras, and electrical, pyrotechnic, and oxygen gear.

Typical kit worn by test pilots. Note the left-hand man's oxygen mask and writing pad and the special aneroid strapped to the other's knee.

"Bare," "tare," and "gross" weights are then determined; the definitions of these terms, taken respectively, are: the weight of airframe and engine with no fixed or removable equipment, but with radiator water; the bare weight plus the weight of fixed equipment; and the weight in flying trim with full military equipment and test instruments in place. Each member of the crew with his parachute, be it of the "observer's" or "seat pack" type, is assumed for these purposes to weigh 200 lb. Weighing being completed, the official determination of the c.g. is made. The airscrew is examined to ensure that it conforms to the design drawings and is finally weighed.

It is customary during an early flight to determine the "position error" of the A.S.I., for, owing to interference from parts of the aircraft with the pitot head, a true reading is not obtained until a correction factor has been applied. Accordingly the machine may be taken over the speed course, which, at Martlesham, is a stretch of the local railway line. If the machine is a multiseater an "air log," which, suspended below the machine, measures the true airspeed, may be employed.

Among the most arduous but necessary of the trials of a military aircraft are "partial climbs," which determine the best rate of climb at a given height and the corresponding climbing speed. Calm weather is, of course, essential. The machine is climbed at various forward speeds, through 1,000ft. intervals at various heights up to its service ceiling (the height at which the rate of climb has dropped to 100ft. per min.) until the best one is obtained.

"Partial climbs" are usually followed by trials to determine "full climb and level speed," which are combined in one test. In the case of machines incapable of climbing above 20,000ft. it is necessary for the pilot to climb only to the service ceiling, and types capable of flying at greater altitudes than this are provided with oxygen for the crew. Should it not be desirable to take a machine above, say, 20,000ft., it is easily possible in these days to predict its performance above that height by working on the results obtained at lower altitudes. At least two climbs are made (the climbing speeds previously determined are closely adhered to), usually by different pilots.

On the first descent, level speed readings are taken at even thousands of feet, and at odd thousands after the second climb has been made. If possible, two barographs are taken and the pilot equips himself with a statoscope (a specially sensitive form of aneroid for recording minute variations in pressure) and a stop-watch, in addition to the normal dashboard instruments. To give some indication of the high powers of concentration required in a test pilot, the following readings are required to be taken at every thousand feet on a "full climb"—height, time to height, air temperature, indicated air speed maintained, r.p.m., boost, mixture setting, water temperatures, oil pressure and temperature, and radiator position. Level speeds are measured over a period of at least three minutes at constant height, the actual readings being taken at the end of that period. From the partial climbs, checked by full climbs and level speeds at various heights, the full performance chart is built up.

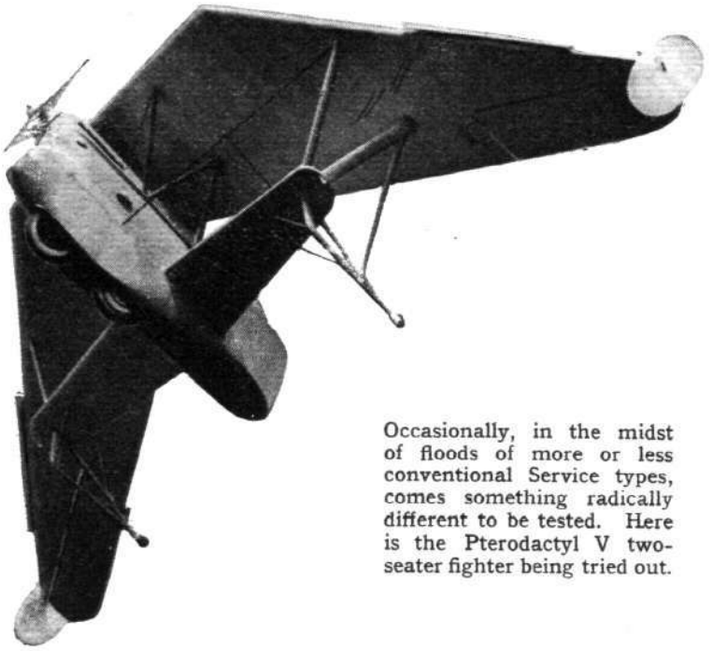
It is essential, of course, that an aeroplane designed for use not only from aerodromes of vast dimensions but rather, if necessary, from fair-sized meadows, shall require short landing and take-off runs. The length of these runs is measured, if possible, on days when the wind is light, and, as the condition of the aerodrome surface and the human factor enter into the question, it is not always easy to obtain accurate results. Owing to the variety of methods employed by various pilots to take an aeroplane off the ground, and the take-off characteristics of individual aircraft, it is difficult to make a ruling, but one condition is always imposed—that the machine must cross the "screen"—an imaginary horizontal line at a certain height above the ground—at a speed which enables it to maintain climb; this, of course, prevents the pilot zooming it to stalling point. Trials are made by two pilots, and the mean of at least six different measurements taken. Distances, times, air speed, and wind velocity are measured, while a camera shows the height cleared during the take-off over the screen.

The stalling speed—the lowest gliding speed which can

be steadily maintained for one minute—is measured, and the best gliding speed is discovered through subjecting the aircraft to "partial glides" (which, incidentally, also tell the designer the degree of efficiency of his aerodynamic design), these being glides with the engine throttled right back.

Range and fuel consumption figures at economical speed, cruising at normal revolutions, and flying at full throttle are extremely desirable. The setting of the mixture control is of paramount importance, as this, to a great extent, will govern fuel consumption.

In addition to the employment of flowmeters, readings of which are taken during flight at various speeds and altitudes, there are other methods of measuring fuel consumption, including obviously the "running dry" of a tank. Figures for the oil temperatures during high-speed level flight and climbs with full Service load are taken by the test pilot.



Occasionally, in the midst of floods of more or less conventional Service types, comes something radically different to be tested. Here is the Pterodactyl V two-seater fighter being tried out.

Liquid- and steam-cooled engines are subjected to exacting tests by making full-load climbs to determine the efficiency of their radiators and condensers. General-purposes machines and those intended for overseas service may be fitted with greater radiating surface than those for home use. Air-cooled engines undergo a special set of tests whereby the cylinder head temperatures are taken at the inlet port or beneath the sparking plug.

It will be agreed that none of the Martlesham tests yet dealt with is particularly emotioning, and it is not, in fact, until the handling, spinning, and diving tests are reached that spectacle accompanies the work of the test pilot.

Handling Tests

Turns, sideslips, landings, and glides with engine on and off are made. There are special sets of tests applicable to machines fitted with slots, interconnected slots and ailerons, and slots and "interceptors." Machines which may be called upon to form aerobatics during the course of their duties are tested in various aerobatic manœuvres —loops of the normal and "rocket" variety; half-rolls off the top of loops; slow, flick, and upward rolls; and certain others which have been made possible only during the past few years by the high performances attained by fighters. Dives with pull-outs of varying sharpness are made in preparation for the subsequent terminal velocity dive.

Normally, spinning tests are made only with single-engined types up to a gross weight of about 7,000 lb. Large bombs and torpedoes may be omitted for this work, as, under war conditions, they could be released should the machine be forced into a spin. The characteristics at each stage of a spin, made to right and left hand, are noted, and a "complete spin" is one of not fewer than eight turns.

In order to determine the steadiness of a structure at high speeds and the stability under similar conditions, diving tests are made. Fighters and light bombers may be dived to their terminal velocity, while other military types, apart from multi-engined bomber transports, are usually dived to a speed 50 per cent. above that which they attain in level flight with the engine at full throttle.

Dives are made with the smaller types at full throttle and with the throttle partially open, and are continued until the engine attains its safe limit of r.p.m. Terminal velocity dives are not started from a height lower than 20,000ft. The tail plane is adjusted so that the machine has to be held in the dive by the pilot, thus making for ease of recovery. T.V. dive speeds in the neighbourhood of 400 m.p.h. are now being attained on single-seater fighters and light bombers; the latter type, incidentally, often approach their terminal velocity in service during dive bombing. On the ascent before the dive, the pilot records the air temperature at every 2,000ft. He notes also the height of the commencement of the dive, the height at which the maximum air speed is reached, maximum air speed and r.p.m., height at commencement of recovery, height at which level flight is regained, and the position of the tail adjustment. A recording air-speed indicator is carried.

For test work a pilot usually wears a Service-type parachute, a special aneroid and stop-watch on his left knee, and a small writing block with two pencils on his right knee. Martlesham has for some time been experimenting with recording instruments for the use of its test pilots, but, so far, has not adopted them to replace the pad.

Service Trials

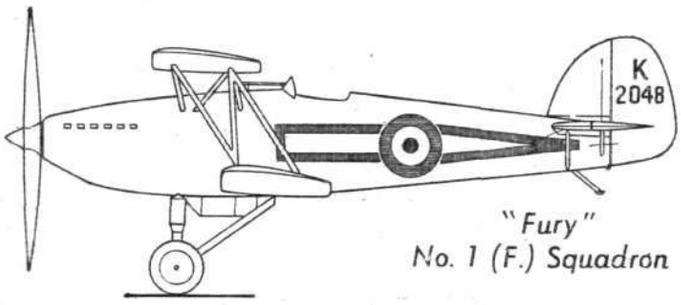
It will be understood that, as the complete trials of a machine are spread perhaps over several weeks, the various readings are obtained under a variety of atmospheric conditions. In order to obtain accurate results and to compare performance of machines, the figures are "reduced" to those which would have been obtained under "standard" atmospheric conditions.

Suppose, now, that two aeroplanes have met with approval—in other words, that "Martlesham is pleased," and that the Air Ministry is considering adoption—they are both sent, at the termination of their tests at Martlesham, to an R.A.F. unit which employs machines of their class, to be operated under the trying conditions of every-day service. Those experienced during war-time are, of course, simulated. The flying qualities, disposition of military equipment, and ease of maintenance are all subjected to the Service eye, and such a point as, say, the position of the machine guns may weigh the balance in favour of one type. General-purpose machines are actually sent to a squadron overseas for test under local conditions, and may be exposed to the effects of sun and sand and changing humidity, and Fleet Air Arm types are given a taste of work from the hard steel deck of an aircraft carrier. Should they be designed for catapult launching, they are perhaps carried on a warship's catapult exposed to the sea air and subjected to the rapid accelerations necessitated.

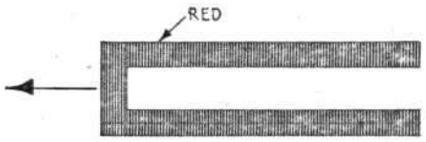
The majority of the tests already mentioned are applicable correspondingly to marine aircraft, although it should be pointed out that twin-float seaplanes are not subjected to terminal velocity dives or inverted flying. Before a new type of flying boat is adopted, it is exposed for long periods to the effects of corrosion, and in all probability makes extended cruises with Service personnel on board.

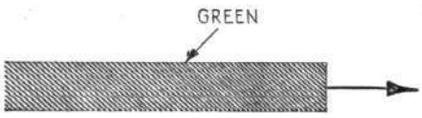
HERALDRY at HENDON

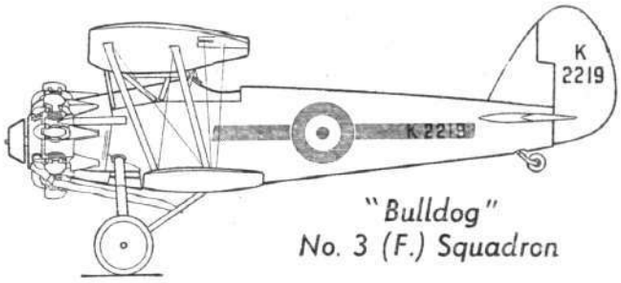
Every Fighter Squadron has its Distinctive Squadron Markings on Fuselage and Top Wing : These are the Colours that Will be Seen at the Display



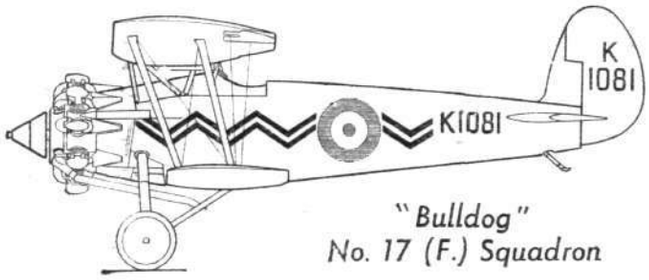
"Fury"
No. 1 (F.) Squadron



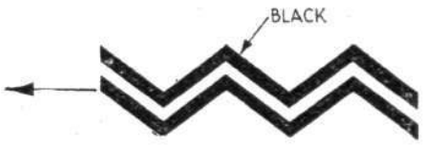


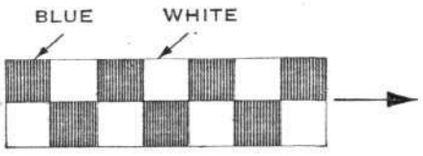


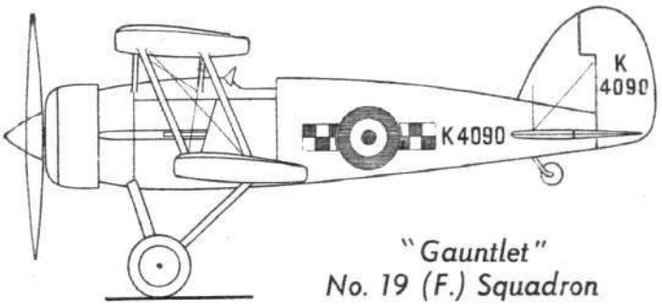
"Bulldog"
No. 3 (F.) Squadron



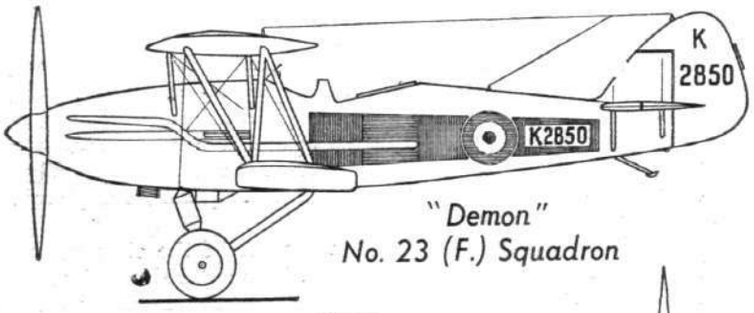
"Bulldog"
No. 17 (F.) Squadron



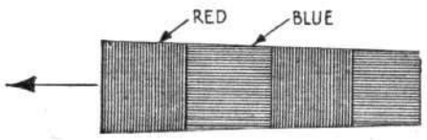


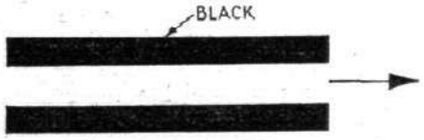


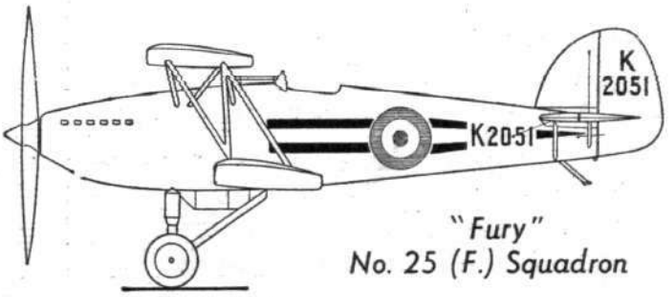
"Gauntlet"
No. 19 (F.) Squadron



"Demon"
No. 23 (F.) Squadron



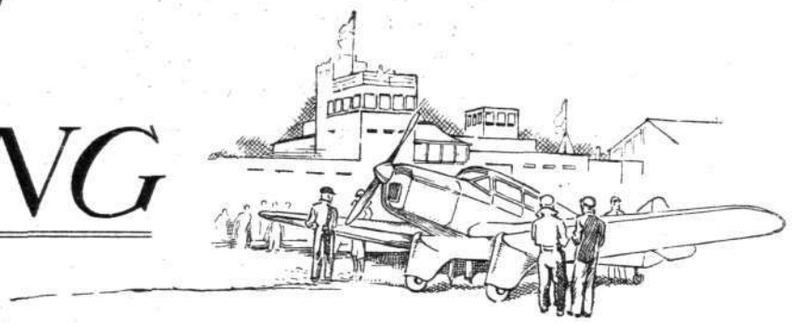




"Fury"
No. 25 (F.) Squadron

In addition to the squadron markings, each flight (three machines) of each squadron has its own distinguishing mark, obtained by painting wheels and airscrew spinner red, yellow or blue.

PRIVATE FLYING



TOPICS of the DAY

Buying Secondhand

THE majority of motorists—and others who are outside this flying business—will probably consider the idea of purchasing a second-hand aeroplane with mounting horror. A used car may involve one in monetary loss if it has been badly treated in the past, but a used aeroplane, they think, may involve the unfortunate owner in much worse things.

Actually, of course, the very rules and regulations which sometimes give the owner a headache generally guarantee the complete airworthiness of the second-hand machine, or at least ensure that the prospective owner cannot buy a "pup" unless he is outstandingly careless. Even then the Air Ministry regulations may prevent him from flying it until it has been modified or overhauled.

A glance at the small advertisements for such machines will show the very wide range of prices, and the majority of owners probably prefer to make a start with the possession of used machines of the conventional type on which they were originally trained. When their hours have been piled up—and if finances permit—they graduate to faster or more comfortable types.

Price Variations

CERTAINLY, if it is taken seriously, a great deal of fun can be obtained from the job of selecting a used machine from a series of three or four which are on sale in various parts of the country.

Even when the three or four prospective machines are all of the same type and year the permutations and combinations are almost unlimited. An inspection of the log books will explain the differences in price or enable the knowledgeable pilot to convince the seller that his price is much too high.

If the machine has recently been overhauled for its C. of A, then, quite obviously, it is worth more, and an exceptionally cheap machine will probably be found to be due for a complete overhaul or, perhaps, for some expensive modification ordered by the Air Ministry. The best example is the machine which has had its engine overhauled, has just passed its C. of A., and been flown for, say, ten or twenty hours to free the engine and control joints. One that has been partially written-off and then rebuilt may have had its more important parts, which suffer from slow deterioration, entirely scrapped—in which case the machine, though obsolescent in type, is virtually a new one.

One owner I know bought a machine which had suffered two very bad smashes and, because nearly all the old material had been eliminated, he has had nothing more than minor troubles and, eventually a very inexpensive C. of A. Needless to say, he has maintained it carefully and made no riotously heavy landings. Regular inspection, with which I hope to deal later, will save an owner from unnecessary expense when the overhauls are due.

The Insurance Question

PARTLY because the statistics are not as complete as they are in the case of other vehicles, and partly because minor mishaps, to which the inexperienced or careless pilot is liable, sometimes require expensive replacements, aircraft insurance, as such, is still a fairly big figure in the yearly budget.

Whereas motor car risks are assessed, to a large extent, on claim payments during a year, aircraft risks must depend on the ability or otherwise of the pilot. Even if his instructor gives him a good report, the unfortunate insurance man still does not know whether he will be quite as consistent with his own machine—or whether, for instance, he will be so lacking in imagination as to attempt to push through impossible weather and find it necessary to put down in a field which is not nearly as good as it looks.

In the case of a moderately low-priced used machine a full cover has always appeared to me as an extravagance, and in any case you may be expected to pay the first £50, say, of a claim—yet your only real risks are damaged undercarriages and broken propellers.

It is probable that third-party insurance will shortly, on the recommendation of the Gorell Committee, be made compulsory, for an amendment to the Air Navigation Act has already been drafted. Such insurance, for claims up to £2,000, costs rather less than £10.

Guiding the Private Pilot

WITHIN the last few months I have come across two examples of short-wave transmission and receiving sets suitable for use in light aeroplanes. One, at least, the Midget Transreceiver, which was described in *Flight* of June 6, is giving extraordinarily good results and weighs something less than 15 lb. complete. At Brooklands, a few weeks ago, I had a chance of using it on the ground, and over a comparatively short distance the reception was almost perfect. A single three-way switch, for receiving, transmitting and "off," and a tuning dial, complete the operating parts.

Short waves, of course, have some of the characteristics of light waves and are impeded by solid objects, but there might be something in the idea of developing such sets for private-owner and club aerodrome use. Certainly there would be no interference with the solid work of the transport people on their medium waveband. Incidentally, the short-wave blind landing system, which was demonstrated to me in Berlin at the beginning of this year, is going ahead rapidly, and some five aerodromes on the Continent are already equipped.

Another promising idea for the more luxurious private type is the radio compass, or homing device, and that produced by Radio Transmission Equipment is being fitted as standard in the new "Jubilee" model Monospar.

INDICATOR.

FROM THE CLUBS

Events and Activity at the Clubs and Schools

TOLLERTON

Eight new associate members joined the club last week, during a great part of which bad weather and strong winds made flying impossible. Flying time, in fact, amounted to 26 hr. 40 min. One cross-country flight was made to Thurso.

CASTLE BROMWICH

Members have made cross-country flights to Hanworth and Walsall, and a "Gull" and a "Hawk" have visited the aerodrome. Mr. E. Bradley and Mr. L. Yates have become members, the former in the flying class. Flying times were 17 hours dual and 7¾ hours solo.

REDHILL

Mr. G. L. Gandy made a night flight from Croydon to Heston to view the floodlighting. A first solo has been made by Mr. S. F. Bissmarck and Mr. A. W. Saunders has completed his "A" licence tests. New members are Messrs. G. H. Winn and D. H. Jorge and Miss Stone. Flying time amounted to 90 hr. 25 min.

ABERDEEN

A party of Civil dignitaries from Edinburgh visited the Airport to acquaint themselves with the new Aberdeen-Edinburgh service. They were flown over by Mr. E. L. Gandar Dower, managing-director of Aberdeen Airways, and inspected the Airport. The return trip was made in less than an hour.

Mr. K. E. Walters has taken over instructional duties at the school. Flying times last week were 5 hr. solo, and 5 hr. 10 min. dual.

NEWCASTLE-UPON-TYNE

The new municipal airport at Woolsington was used for the first time last Thursday; a machine evidently mistook it for Cramlington. Actually, the airport is not yet ready for traffic and will be opened officially on Friday, July 26.

Tests for "A" licences have been made by Messrs. T. A. Glover, J. F. Langton and H. J. Talbot. Mr. E. L. Wardle has become a member.

Of the 41 hr. 50 min. flying logged last week 31 hr. 5 min. were solo.

CAMBRIDGE

Sir Alan Cobham's display, which was at Cambridge last Thursday was unfortunate in having the worst day of a bad week.

The "Puss Moth" has been away on charter work on several days, and the workshops, which have received another "Moth" for C. of A. are still working overtime. Three new members joined the Cambridge Aero Club during last week.

On Sunday ten members of the Civil Aviation Corps attended and all of them flew, three for the first time. Flying time was 58 hr. 5 min.

NORFOLK AND NORWICH

The weather since Whitsun has prohibited any great amount of flying, and not until this last week-end have conditions been favourable. However, in spite of this, Messrs. A. S. Peter, A. Stuart, H. S. Whitworth, A. P. Shawcross, F. Hill, P. Gold and A. A. Rice have received dual from Mr. J. Collier.

A number of photographic flights have been made, and several "cross countries," including one to Yeovil. Last Tuesday a party of members of the Insurance Institute, Norwich, visited the club and was shown how pupils are taught to fly. On Wednesday evening F/O. A. J. S. Morris took a club machine over to Gresham's School and landed it on the playing fields, where he gave a short lecture on flying. Mr. M. King, a private owner, followed F/O. Morris over to the school and gave a demonstration of aerobatics.

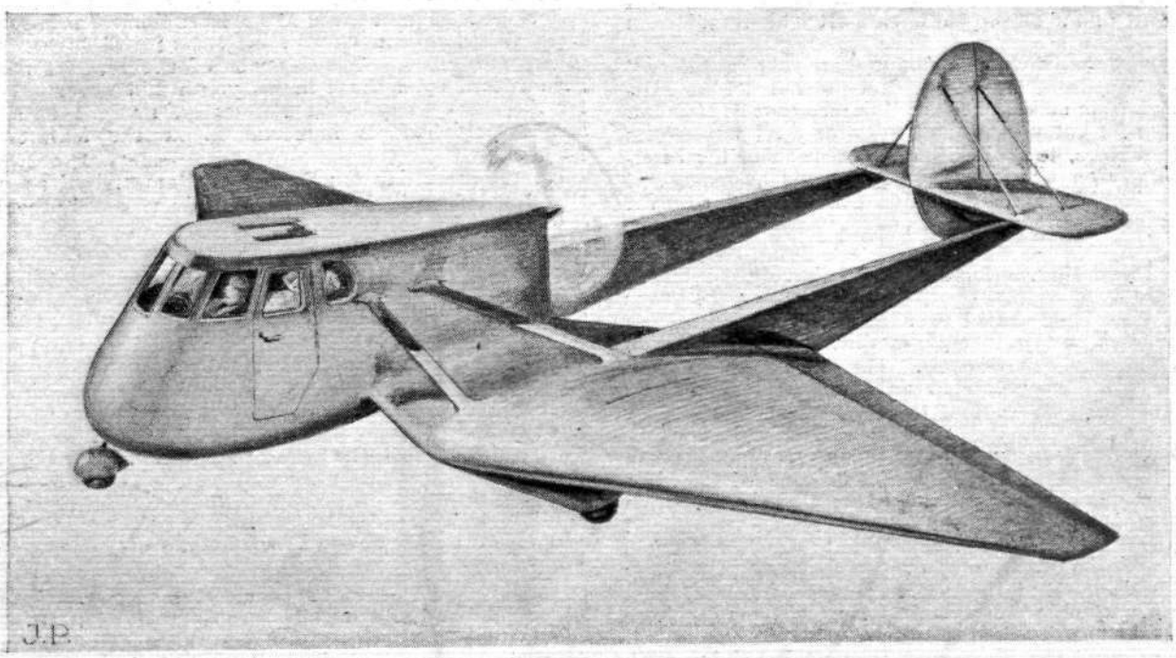
BROOKLANDS

A very successful informal dinner and dance was held at the club on Saturday, 15th.

The Sales Department has been extremely busy, visiting Blackpool, Liverpool, Leicester, Stoke and Northampton. It has disposed of five machines, including a "Moth" to Mr. I. Scott, of Aberdeen, and two to present club members—Mr. C. Frost having acquired a "Moth" and Mr. J. A. M. Henderson a "Tiger." Mr. Henderson is a director of Brooklands Air Taxis, Ltd., and the "Tiger" will be available for use by the company when necessary.

Captain H. D. Davis returned on Saturday after a busy week spent at Northampton, organising the running of the Reserve School. New members include Sir Harold Moore, Miss P. Duncan and Mr. G. H. Ford. Mr. Moorby has passed his "B" licence tests and Mr. Eric Alliott has returned to duty on the flying staff after sick leave.

During the week two French gentlemen landed and asked for directions to Heston. Two members of the club offered to pilot them, and escorted the French machine as far as Heston Airport. The College of Aeronautical Engineering are now building another glider. Mr. Coveney, of G.Q. Parachutes made a very fine parachute landing in front of the club. He dropped from one of the club machines, and the descent was filmed from another club machine.



TOWARDS THE IDEAL: In *Flight* of December 6, last year, a new type of pusher for private owner use was described. This machine, the Hammond Model Y, was designed to the order of the U.S. Bureau of Air Commerce, and its various novel features can be gathered from this sketch.

Private Flying

LIVERPOOL
No less than 67 hr. 15 min. flying time was recorded in a very unsettled week with high winds and thunderstorms.

BENGAL
Owing to the shortage of aircraft, flying times for May were poor, amounting to 19 hr. 35 min. dual and 3 hr. 55 min. solo.

With the assistance of the private owners, who loaned their aeroplanes, the club was able to put up an excellent formation in conjunction with Indian National Airways at the Jubilee Commemoration Parade.

During the month Messrs. R. Pax and P. Mookerjee commenced taking dual instruction.

NORTHAMPTONSHIRE
Several people have flown to Sywell to inspect the new buildings which have been laid down for the R.A.F. Reserve School. The fine week-end brought a number of members to the aerodrome, and on Sunday a formation made a tour of the countryside.

On Friday a dinner was held in Bedford to commemorate the successful Jubilee air display, in which members of the Northamptonshire Aero Club took part.

Mr. C. Partridge has become a member.

HANWORTH
Members availed themselves of the brief spells of reasonable weather in an unattractive week, and considerable progress was made. Licences have been renewed by Messrs. D. M. Mehta, a new member, O. P. Gunning and F. L. Lett, and Mr. L. S. Smith has taken his "A" licence. Flying time was 72 hr. 10 min.

Mr. R. J. Ashley, one of Sir Alan Cobham's pilots, called at the Cierva Autogiro Co., Ltd., for a general check up of his C.30 after having completed 160 hours flying, and carried just over 700 passengers in nine weeks.

New pupils of the Autogiro School are Messrs. Mayo and Duffey, the latter for the complete "A" licence course.

Mr. Dubash completed tests for endorsement of the C.30 on his "B" licence; and Cdr. Cacace, of the Italian Air Force obtained his "A" licence. Lt. Corellou, of the Airship Section of the French Air Force, completed his full *ab initio* course

Flying time at the Autogiro School, was 74 hr. 5 min.

CINQUE PORTS
Four members during the past week completed their "A" licence tests. They were the Marquess of Kildare, the Hon. Peter Rous, Mr. P. J. Johnson, and Mr. W. H. C. Birbeck. Lord Kildare made his first solo flight on Monday. A total of 78 hours flying was registered last week. Capt. Duncan Davis spent a few days at Lympne, and while the chief instructor, Mr. K. K. Brown, was on a charter trip to Paris in the "Leopard" put in several hours instruction.

New members are Mr. H. A. Taylor, who has already done sixty hours solo, and Mr. Clifford Cameron. Mr. Noel Coward, a vice-president of the club, paid a visit after his return from Singapore.

Low-lying mist caused the unannounced arrival of a "Fury" from No. 25 Squadron, Hawkings, and prevented Miss Margaret Cunnison from making her "B" licence tests at Hendon.

Applications for entry forms and rules for the Cinque Ports Wakefield Cup Race, to be held on the occasion of the International Air Rally on August 24 and 25, should be made well in advance. Any further information can be obtained from the club not later than August 15.

READING
Messrs. Lloyd Mainwaring and Bishop have just returned from a week's tour of the Continent in the former's Miles "Hawk Major." They visited Frankfurt (to which they flew non-stop from Lympne via Brussels in 3 hr. 20 min.), Cologne, Dusseldorf, Antwerp and Brussels. Their most amusing experience was when they entered an attractive-looking beer garden at Antwerp only to find that it was the local Stock Exchange.

Last Friday a Western Airways "Dragon" brought a party from Bristol to Reading, whence they left by car for Ascot.

Bad weather did not prohibit 41½ hours flying. Mr. Bligh and Mr. Buller have passed their "A" licence tests, and together with Miss Buss, have gone solo. Mr. I. Fatti has returned from South America to qualify for his "A." New pupils include Capt. H. S. Ford, Mr. Hamlin Thomas, Miss Ashton Cross and Miss Sutherland. Mr. "Tommy" Rose demonstrated a "Falcon" at Renfrew, and Flt. Lt. J. F. Lawn gave an aerobatic display at the R.A.F. Flying Club garden party. A "Falcon" was despatched to Spain on Friday, another on Saturday, and Mr. Davies, of Cardiff, took delivery of a De Luxe "Hawk Major."

BRISTOL
Last Friday evening the Bristol Club was visited by a formation of machines from the Cardiff Aeroplane Club led by Mr. "Spragg" Cope. Three machines from the Bristol Club visited Heston on Sunday morning for breakfast, returning to Bristol immediately afterwards in time for the day's work.

Mr. M. F. C. Smith has completed tests for his "A" licence, and Messrs. E. W. Butler and P. L. Spinks have become pilot members.

YORKSHIRE
Thirty of the fifty Aviation Group members are now taking flying instruction. Mr. A. Barker, a member of the Group, and Mr. S. G. Beaumont have both achieved their first solos.

F/O. B. E. Moody, the club's assistant instructor, and Mr. F. E. Rhodes, a member, who are making a Continental tour, have arrived safely at Berlin.

The new air lines from Yeadon to Blackpool and the Isle of Man, run by West Coast Air Services, Ltd., and United Airways, Ltd., have done very good business this week, due, no doubt, to the T.T. Races.

Club machines flew 39½ hours last week despite changeable weather.

HATFIELD
The film of the London Aeroplane Club's garden party will be released on July 4, and shown at the Monseigneur and the Eros.

New members of the London Aeroplane Club are Mrs. Barton, Miss Sawyer, Messrs. A. Auping, I. D. Bain, Capt. Catbutt, C. C. Clegg, J. G. Cuncliffe-Lister, J. C. K. Rogers, G. Oliven, D. E. Rae, and F. Watts, and Messrs. T. J. Campbell and M. Constant have made first solos.

Last week's flying time was 68 hr. 40 min. Three "Moths" arrived at Hatfield on Wednesday from India. Mr. Rollason took delivery of a new "Rapide," G-ADAI, for British Continental Airways, and Hillman's took over their second "86."

Sherburn Changes

Mr. Robert Blackburn has purchased the York County Aviation Club's aerodrome at Sherburn-in-Elmet. Presumably a new reserve training school will be established there, but it is not anticipated that the transaction will disturb the normal club operations.

Preliminary plans have already been drawn up for the erection of a new hangar and clubhouse with residential accommodation, swimming pool, squash court and tennis court. Mr. Blackburn, of course, has taken a keen interest in the club for several years.

Heston Visitors

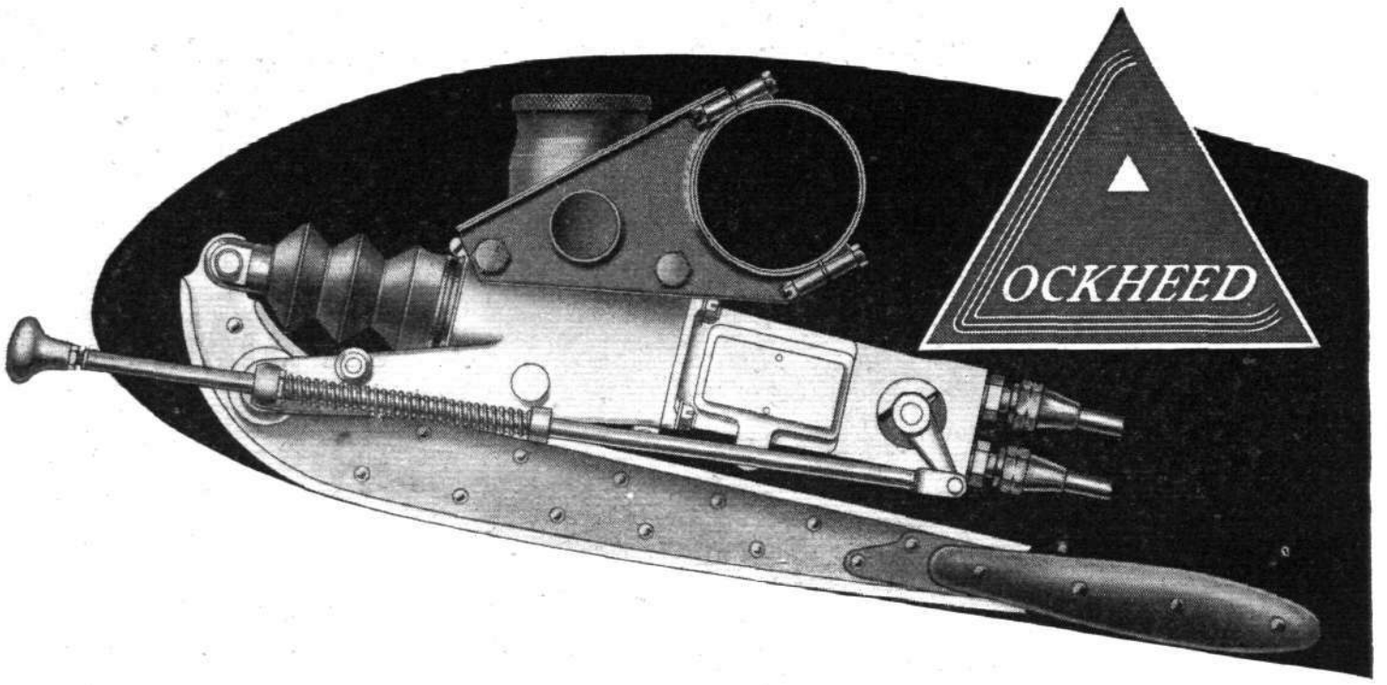
Towards the evening of June 14 Fraulein Elly Beinhorn arrived at Heston at speed in a Messerschmitt, and, soon after, Herr Wolfgang von Gronau arrived at still higher speed in a larger Heinkel. The designer of the Heinkel must have been chased by a shark in his youth and never got over it, for the shark's expression of ferocity, mingled with pleasurable anticipation, is immortalised in the features of the Heinkel.

On the same day ten Spanish visitors arrived as guests of the Royal Aero Club and, as already reported, the Bombay circus also arrived under the leadership of Mr. A. C. Gazdar. Flt. Lt. Carey, by the way, who accompanied the flight in his "Hawk Major," has returned to England permanently.

Capt. Baker enjoyed himself with a moustache on Tuesday of last week, when he doubled for Claude Hulbert and Douglas Fairbanks, Junr., in Warner Brothers' latest production. Very few flying instructors, incidentally, wear moustaches, though they (the moustaches) look well enough with a helmet. Beards would be even more effective. Flying shots for "The Last Journey," the current Julius Hagen production at Twickenham, are to be taken at Heston soon, and this time Air Hire will provide the aeroplanes.

Another Austrian Event

Between August 10 and 20 the Second International Austrian Alpine Flight will take place. This event, which is open to light aeroplanes, is to be organised by the Oesterreichischer Aero Club, and will include a rally, a speed trial, a take-off and landing competition, and an Alpine flight, while several days are reserved for rest and general sight-seeing. Entries must be received before July 15—or, at double fee, by August 1—and full particulars can be obtained from the Royal Aero Club.



RAPID WING FOLDING

Lockheed equipment now in use is proving to be the most satisfactory solution to the problem of operating the spar pins of folding wings.

Ordinary mechanical actuation is full of difficulties which are well known; direct manual actuation—calls for man-power acrobatics with corresponding uncertainty and risk of serious injury.

The Lockheed system of hydraulic actuation—with details so perfected that the system withstands low temperatures and the drastic misuse and neglect of road vehicle users throughout the world—has been adapted to give an efficient, light and effective control which greatly diminishes the chief risks and difficulties of wing folding and spreading and saves valuable time in landing the ship on deck. The master cylinder is shown above (within the leading edge), the spar pin unit is shown below. Designers will appreciate the 'flexibility' of a system which calls for only simple copper piping between these units.

Those interested in this control, and in Lockheed controls for wing-flaps and retractile undercarriages, should write to:—

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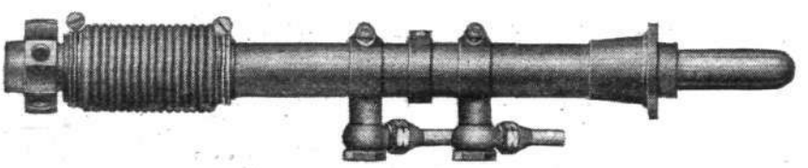
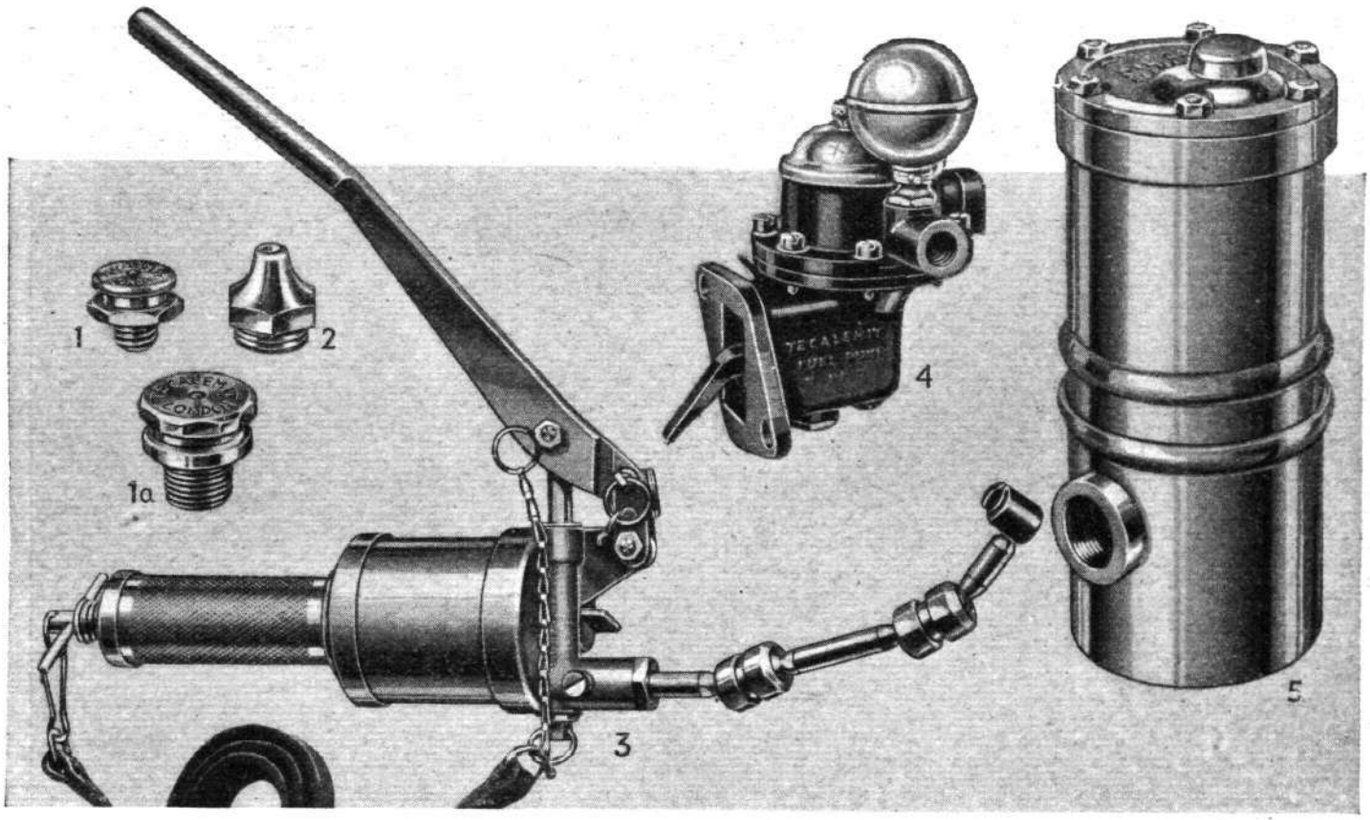


LOCKHEED

HYDRAULIC SPAR-PIN ACTUATING GEAR



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THE ROYAL AIR FORCE

SERVICE NOTES AND NEWS *AIR MINISTRY ANNOUNCEMENTS*

LORD LONDONDERRY'S FAREWELL

THE following farewell message has been received by the Air Ministry from The Marquess of Londonderry:—

"It is with feelings of deep gratitude and profound regret that I bid farewell to the Air Ministry and the Royal Air Force at the close of my period of office as Secretary of State for Air which has extended over the past three and a half years.

"These years, though they have been full of grave responsibilities, have been singularly happy years to me personally, because I have been conscious throughout of the whole-hearted and ungrudging support of all those whose assistance I have been privileged to enjoy in my daily work as Secretary of State, in the interests of our civil and military aviation.

"Together we have been privileged to initiate great schemes for the expansion of the Royal Air Force, for the development of our Empire Air Lines, and for the extension of the facilities for both private and commercial aviation in this country.

"Much has been accomplished, but no one knows better than myself that there is much still to be done, and though my official association with the Air Ministry and the Royal Air Force has ceased I can assure all my friends with whom I have been so proud and so happy to be associated that they will continue to have my active interest and support.

"I have visited the Royal Air Force during my period of office at its stations both at home and abroad. I have the utmost admiration for the spirit which animates all ranks and the fullest confidence in their efficiency. I have made two extensive tours by our Empire Air Lines, and I have constantly travelled by air in this country during my period of office. My experience has proved to me that I have every reason for satisfaction with the progress which we are making, and I am encouraged to look to the future of British civil aviation with assurance. Year by year, month by month, the public are becoming more and more conscious of the advantages of travel by air. When I first took office in the autumn of 1931, a journey by air was still regarded as something of an adventure; to-day, the aeroplane is simply an everyday alternative means of transport. It is a familiar vehicle for passengers, for letters and for goods. The whole future lies before it.

"I am proud to have been connected with a record of progress such as this, and I send a grateful message of thanks to all my colleagues in the service and civil departments of the Air Ministry, to all ranks of the Royal Air Force, and to all those whose work for aviation in all its branches has been of such inestimable assistance."

CHESIL BANK RANGE

A deputation headed by Lord Shaftesbury, Lord Lieutenant of Dorset, and including Lord Ilchester, Sir Lawrence Chubb, Professor Salisbury, Dr. Calman, Professor Huxley, and Lord Mansfield, waited upon the Secretary of State for Air on June 18, to protest against the establishment of a bombing and air firing range near Chesil Bank. Sir Philip Cunliffe-Lister pointed out that if the expansion of the Air Force was to be carried out successfully, nine target ranges were necessary, of which the Air Ministry had been able to secure three, and had located sites for two more, excluding Chesil Bank. If this last were abandoned, the Air Force would be definitely deprived of one necessary target range. It was not proposed to drop H.E. bombs inside the three mile limit, and only light smoke bombs would be dropped nearer in. Flt. Lt. Godfrey, an armament officer and a naturalist, then assured the deputation that birds on other ranges not only became accustomed to gun fire, but actually nested round the targets.

No. 1 M.T. STORAGE UNIT—HENDON

No. 1 M.T. Storage Unit will commence to form at Hendon on August 1, 1935. Accommodation will be available for 100 vehicles on August 1, 1935, increasing to 350 vehicles before January 1, 1936. Of these, 150 can be of the large and 200 of the small type. No. 1 M.T. Storage Unit will be administered by the Air Ministry (D. or E.)

NOMENCLATURE OF AIRCRAFT—D.H.89

The official description of the de Havilland communication aeroplane No. K.5070 is D.H.89.

H.M.S. "EAGLE"

H.M.S. *Eagle* returned to the United Kingdom on April 5, 1935, to pay off. No. 825 (F.S.R.) squadron was disembarked at Malta prior to the departure of H.M.S. *Eagle* from the Mediterranean station. The R.A.F. Headquarters, H.M.S. *Eagle*, ceased to exist with effect from May 20, 1935.

ROYAL AIR FORCE FLYING CLUB

A resolution was passed at a recent special general meeting of the Royal Air Force Flying Club whereby the annual subscription for officers of the regular air force, Special Reserve and Auxiliary Air Force was reduced to £2, payable half-yearly if desired.

LANGUAGES AWARDS

Commencing with the examinations to be held in June, 1935, the grant of awards for proficiency in colloquial Arabic, Kurdish, Persian, Syriac and Turkish will be extended to airmen below the rank of flight-sergeant whose duties render a knowledge of such languages desirable.

AIR AMBULANCE AT MANŒUVRES

At military manœuvres round Carnarvon recently, experiments were made by a Divisional R.A.M.C. to test evacuation of wounded by air. The War Office would not allow troops to be carried by air, so civilian organisations were employed. The supposed wounded were civilians, and the aeroplane was piloted by Mr. C. Wilson of the Lancashire Aero Club.

THE R.A.F. BENEVOLENT FUND

The usual meeting of the Grants Committee of the Fund was held at Iddesleigh House on Thursday, June 20.

Mr. W. S. Field was in the chair, and the other members of the Committee present were: Mrs. L. M. K. Pratt Barlow, O.B.E., Air Comdre. B. C. H. Drew, C.M.G., C.B.E., and Wing Cdr. H. P. Lale, D.S.O., D.F.C. The Committee made grants to the amount of £319 6s. 4d. The next meeting was fixed for July 11.

AIRMEN OF THE ARMAMENT TRADES

The number of airmen qualified for employment as senior armament instructors is not yet adequate to meet requirements and the demand will be largely increased as a result of the expansion of the air force. It is essential that instructor posts should be filled to the greatest extent practicable by airmen so qualified, and for some time to come, therefore, it may be necessary to post airmen of inferior rank to that allowed in establishments to fill the non-instructor posts. The Officer i/c Records will, in so far as the supply of airmen permits, arrange postings so as to minimise the difficulties of the situation.

ANTI-AIRCRAFT COMPANIES

The reorganisation of Royal Engineers fortress units in the Far East, Malta and Gibraltar was announced in Army Orders on June 20.

The changes—which have received the King's approval—include the formation of a new anti-aircraft searchlight company in Malaya, the redesignation of anti-aircraft searchlight companies as fortress companies at Hong Kong and Malta, and the establishment of two mixed defence electric light and anti-aircraft searchlight companies at Gibraltar.

The new anti-aircraft searchlight company in Malaya is to be designated the 30th (Fortress) Company. It will be stationed with the 41st (Fortress) Company, now at Singapore. At Gibraltar the new mixed defence electric light and anti-aircraft searchlight company will be designated the 32nd (Fortress) Company.

The 1st Anti-Aircraft Searchlight Battalion at Blackdown has been redesignated the 1st Anti-Aircraft Searchlight Group.

The 6th and 15th (Field Park) Companies (cadres)—at Aldershot—are to be expanded to full establishment, and another cadre, the 18th Company (Field Park) (Colchester), is to be absorbed into the 6th (Field Park) Company (Aldershot).

R.A.F. RECRUITS

Sir Philip Cunliffe-Lister, Air Minister, stated in the House of Commons recently, that between May 22 and June 15, 13,800 definite applications for enlistment had been received, of which 6,200 applicants were prima facie suitable. Up to the latter date 700 had been finally accepted.

THE AIR OBSERVER SCHEME

It has been decided that air observers, as they become available, will be introduced into squadrons as far as possible in the same order in which the squadrons are to be brought within the scope of the new fitter organisation. Twin-engined bomber squadrons will not be affected at present, however.

On transfer to the air observer organisation the establishment of a squadron will be amended so as to include its full complement of air observers, and the authority included therein for the issue of air gunner and crew pay will be wholly or partly deleted according to the type of squadron. The training arrangements for air observers render it improbable that each squadron will receive its full strength of air observers at one time. Until informed by the Officer i/c Records, therefore, that the posting of air observers to his squadron is complete, an officer commanding may continue to authorise air gunner and/or crew pay for a number of airmen not exceeding those formerly allowed on establishment less the number of air observers actually posted to the squadron.

AIRCRAFT MAINTENANCE IN SQUADRONS

To carry out the accelerated expansion programme approved by H.M. Government, it will be necessary to increase largely during the next two years the number of airmen available to carry out duties in connection with the maintenance of aircraft. The first step to this end will be to expedite the introduction into units of the new fitter organisation with the result of economising the use of skilled men. The number of airmen placed under training as mates will be greatly increased and the selection of aircrafthands for such training will be supplemented by a large direct entry of airmen.

The second step will be the direct entry of skilled fitters from civil life for training. Such entrants will be trained for periods up to a year as fitters (aero-engine); they will be employed in units into which the new fitter organisation has not yet been introduced.

It is anticipated, however, that it will be possible to meet only a limited proportion of the demand by the entry of skilled fitters; for the balance, it will be necessary to enter men of little skill or experience in civil life who will not be capable of being brought to the standard of fitter (aero-engine), or metal rigger, in the time available for their training. It has accordingly been decided to create two temporary group II trades, to be known as flight mechanic and flight rigger, to which such men will be remustered on the completion of their training.

ROYAL AIR FORCE GAZETTE

London Gazette, June 18.

General Duties Branch

Lt. J. M. Bruen, R.N., is granted a temporary commission as Flying Officer on attachment to the R.A.F. (May 27); Acting Pilot Officer on probation E. H. Wheelwright is graded as Pilot Officer on probation (Aug. 25, 1933) (substituted for the notification in the *Gazette* of April 10, 1934), F/O. F. A. J. Pollock-Gore is promoted to the rank of Flight Lieutenant (April 14).

The following Pilot Officers are promoted to the rank of Flying Officer:—E. H. Wheelwright (Feb. 25); C. F. Pearce, E. T. Smith (April 9); A. C. Mills (April 15); J. W. Buchanan, P. N. J. Wilkins (April 23); J. H. G. Sarll (June 2); E. L. A. Walter (April 2); I. W. Braye (May 12).

Flt. Lt. B. W. T. Hare is placed on the retired list at his own request (June 15); Sqn. Ldr. A. D. Macdonald, M.C. (Capt. R.A.R.O.), is transferred to the Reserve, class C. The short service commission of Acting Pilot Officer on probation D. J. Henderson is terminated on cessation of duty (June 19); Lt. Cdr. J. H. I. Wood, R.N., Flying Officer, R.A.F., relinquishes his temporary commission on return to Naval duty (May 4); P/O. J. O. Carter resigns his short service commission (June 1).

Stores Branch

The following Flying Officers are promoted to the rank of Flight Lieutenant:—J. T. Riggs (Jan. 10); J. W. Hunt (April 28).

Chaplains' Branch

The Rev. J. H. P. Still, M.A., is promoted to the relative rank of Group Captain (May 24).

ROYAL AIR FORCE RESERVE

Reserve of Air Force Officers

General Duties Branch

The notification in the *Gazette* of May 7 concerning Pilot Officer on probation R. C. Thorn is cancelled; F/O. K. R. Boulton relinquishes his commission on completion of service (May 6); F/O. S. M. M. Watson relinquishes his commission on appointment to a commission in the New Zealand Air Force (April 24); F/O. A. C. W. Richards relinquishes his commission on completion of service, and is permitted to retain his rank (June 10).

SPECIAL RESERVE

General Duties Branch

F/O. G. R. H. Black is attached to the R.A.F. from April 24 to Oct. 23 inclusive. (Substituted for the notification in the *Gazette* of May 21.)

AUXILIARY AIR FORCE

General Duties Branch

No. 600 (CITY OF LONDON) (FIGHTER) SQUADRON.—D. de B. Clark is granted a commission as Pilot Officer (May 27).

No. 602 (CITY OF GLASGOW) (BOMBER) SQUADRON.—P/O. E. V. N. Bell is promoted to the rank of Flying Officer (June 1); F/O. T. B. Smith relinquishes his commission on completion of service (June 14).

No. 603 (CITY OF EDINBURGH) (BOMBER) SQUADRON.—J. L. G. Cunningham is granted a commission as Pilot Officer (May 6).

AUXILIARY AIR FORCE RESERVE OF OFFICERS

General Duties Branch

T. B. Smith is granted a commission as Flying Officer in class A (June 14).

ROYAL AIR FORCE INTELLIGENCE

Appointments.—The following appointments in the Royal Air Force are notified:—

General Duties Branch

Squadron Leaders.—L. G. Harvey, to Marine Aircraft Experimental Establishment, Felixstowe, 13.6.35; for Engineer duties vice Sqn. Ldr. D. F. Lucking. A. G. Bishop, O.B.E., A.F.C., to Headquarters, Far East Command, Singapore, 15.6.35; for liaison duties with G.O.C.-in-C., Hong Kong.

Flight Lieutenants.—A. W. Elias to No. 27 (B) Squadron, Kohat, India, 12.5.35. P. C. Fair, to No. 1 Armoured Car Company, Hinaidi, Iraq, 7.6.35. L. K. Barnes, to Headquarters, Inland Area, Stanmore, 17.6.35. P. J. A. Hume-Wright, to D.O.I., Dept. of C.A.S., Air Ministry, 17.6.35. J. St. C. Arbuthnott, to No. 201 (F.B.) Squadron, Calshot, 7.6.35. E. J. H. F. Moreton, to No. 201 (F.B.) Squadron, Calshot, 7.6.35.

Flying Officers.—L. S. Lamb, to Home Aircraft Depot, Henlow, 10.6.35. E. Shipley, to No. 209 (F.B.) Squadron, Felixstowe, 7.6.35.

Pilot Officers.—H. D. Beck, to No. 825 (F.S.R.) Squadron, Malta, 7.6.35. C. C. Byar, to No. 201 (F.B.) Squadron, Calshot, 7.6.35. J. L. Crosbie, to No. 209 (F.B.) Squadron, Felixstowe, 7.6.35. T. I. Davies, to No. 204 (F.B.) Squadron, Mount Batten, 7.6.35. V. H. A. McBratney, to No. 201 (F.B.) Squadron, Calshot, 7.6.35. E. L. F. Meynell, to No. 201 (F.B.) Squadron, Calshot, 7.6.35. R. D. A. Wills, to No. 230 (F.B.) Squadron, Pembroke Dock, 7.6.35. B. A. C. Wood, to No. 209 (F.B.) Squadron, Felixstowe, 7.6.35. G. J. Wright, to No. 210 (F.B.) Squadron, Pembroke Dock, 7.6.35.

Acting Pilot Officer.—W. Townson, to No. 1 Armoured Car Company, Hinaidi, Iraq, 1.6.35.

Stores Branch

Squadron Leaders.—H. E. Tansley, M.C., to D. of E., Dept. of A.M.S.O., Air Ministry, 17.6.35. L. H. Hillier, to R.A.F. Station, Singapore, 15.6.35; for Stores duties.

Flight Lieutenants.—C. I. Fry, to D. of E., Dept. of A.M.S.O., Air Ministry, 14.6.35. H. D. Giblett, to Headquarters, Far East Command, Singapore, 15.6.35.

Accountant Branch

Flight Lieutenant.—E. L. G. Le Dieu, to Administrative Wing, Cranwell, 10.6.35.

Pilot Officers.—The following Pilot Officers are posted to Headquarters, R.A.F., Cranwell, on 12.6.35, on appointment to Permanent Commission:—H. C. Fleming, R. O. Heath, and F. H. Shutt.

Medical Branch

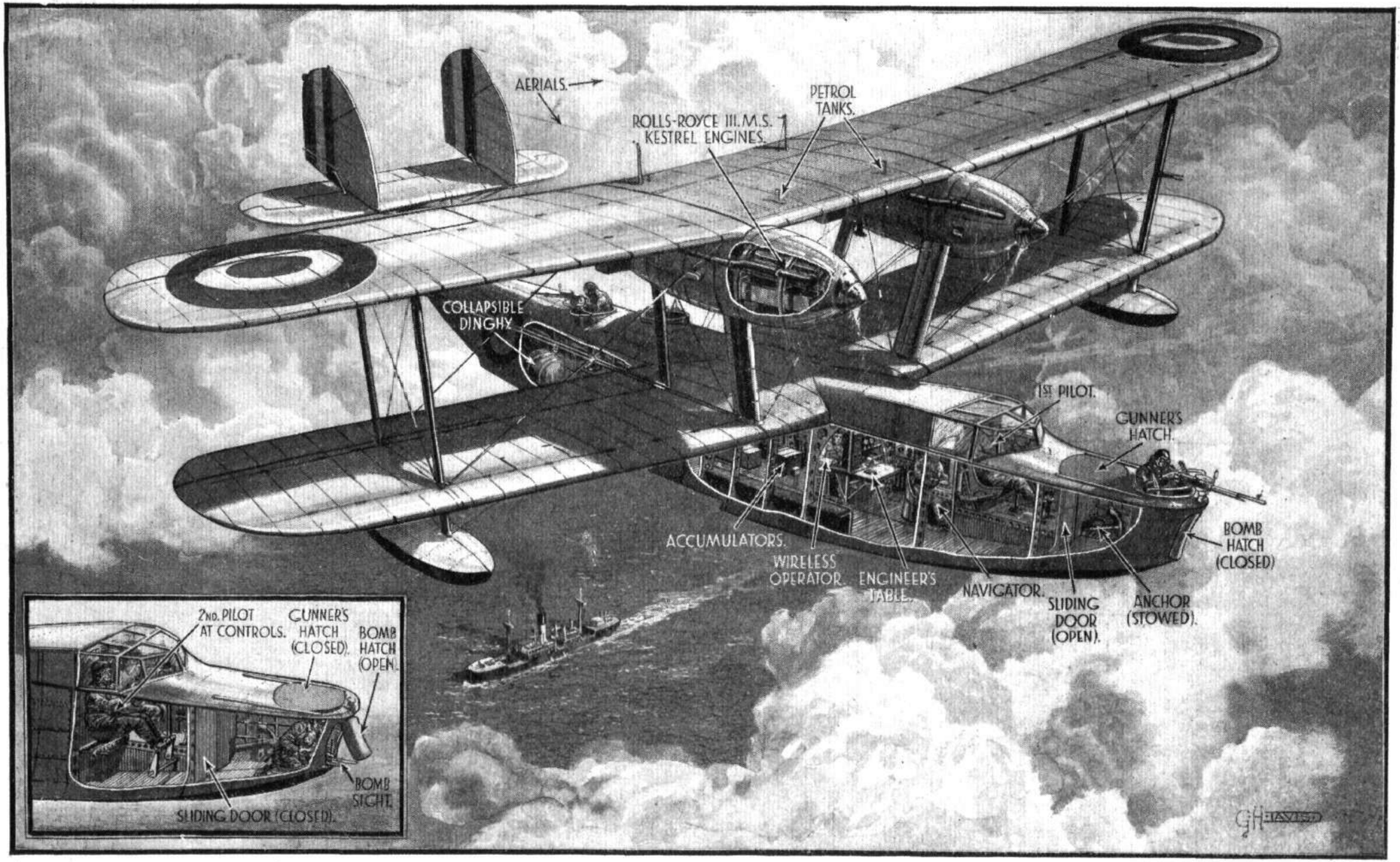
Wing Commander.—D. McLaren, to R.A.F. Depot, Middle East, Aboukir, 8.5.35; for duty as Senior Medical Officer.

Squadron Leaders.—C. A. Lindup, to Aeroplane and Armament Experimental Establishment, Martlesham Heath, 12.6.35; for duty as Medical Officer. A. A. Townsend, to R.A.F. Station, Worthy Down, 11.6.35; for duty as Medical Officer. E. D. D. Dickson, to Central Medical Establishment, 17.6.35; for duty as Medical Officer with No. 2 Central Medical Board. R. W. White, to No. 1 Air Defence Group Headquarters, 15.6.35; for duty as Medical Officer.

Flight Lieutenants.—R. N. Kinnison, to R.A.F. Officers' Hospital, Uxbridge, 11.6.35. M. T. O'Reilly, to No. 25 (F) Squadron, Hawkinge, 13.6.35. G. O. Williams, to Central Medical Establishment, 13.6.35. C. R. Palfreyman, to Central Medical Establishment, 17.6.35.

Flying Officer.—J. S. Wilson, to No. 26 (Army Co-operation) Squadron, Catterick, 10.6.35.

A MARINE VISITOR to HENDON



Among the seven flying boats which are to appear at the R.A.F. Display on Saturday is the Vickers-Supermarine "Scapa," which is now being used in considerable numbers; its duties include reconnaissance, bombing, and navigational training. The engines are two Rolls-Royce "Kestrel III M.S." (525 h.p. moderately supercharged vee-twelve, water-cooled); the span is 75 ft. and overall length 53 ft. This part-sectional drawing by G. H. Davis shows the layout of the crew accommodation and principal features.

Correspondence

The Editor does not hold himself responsible for the opinions expressed by correspondents. The names and addresses of the writers, not necessarily for publication, must in all cases accompany letters intended for publication in these columns.

A CONTEMPORARY "POU"

[3050] Last year I applied for patents relating to variable incidence-area in conjunction with aeroplane wings, and considering the great interest by "*Pou*" enthusiasts in M. Mignet's design, perhaps the enclosed drawings would be of interest to your readers.

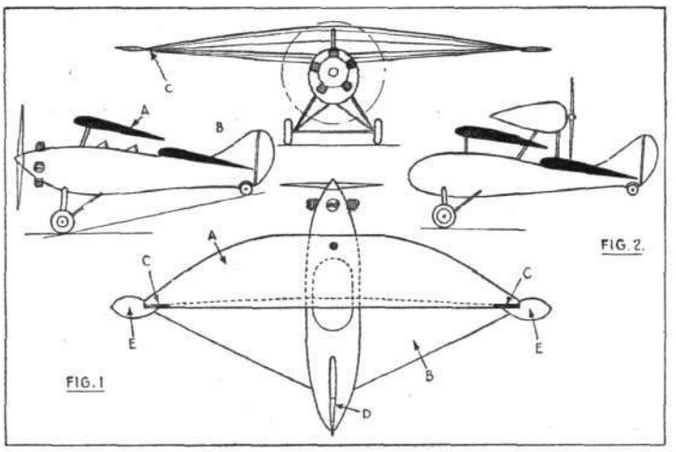
The figures show arrangements of two wing surfaces A and B hinged at C. Thus the incidence of the swept back wing A can be varied in relation with the fixed wing B.

A rudder D is provided, but the steering would preferably be executed by flaps mounted at the wing tips of the stationary wing B.

It is to be noted that the "slot" or the opening between the two wings is not so wide as in M. Mignet's design, and, due to the special design followed in mounting the two wings, the construction is rigid and easy to manipulate.

Figure 2 indicates the modified type and indicates the side view of the machine using a pusher screw. Of course, a portion of the variable-incidence front wing A would be cut out in the middle to accommodate the stand bearing the engine assembly. (MISS) R. MACDONALD.

[Miss MacDonald has submitted for our inspection a model of the pusher design.—ED.]



Sketches of Miss R. MacDonald's design. The two surfaces, A. and B., are hinged at C.

SPAR DESIGN

[3051] It is not the purpose of this letter to disparage in any way the article on spar design by Mr. J. F. Cuss in *The Aircraft Engineer* of June 20. The article is an able and interesting one and will be useful to all designers of wooden aircraft, but it should be pointed out that any computation of the strength of wooden spars based on the simple theory of bending must be treated with great caution. The theory is fundamentally unsound and, though it has been widely used *faute de mieux*, there is no longer any necessity to do so since the publication (in *Schweizer Bauzeitung*, November 3, 1934) of an account of the work of Prof. W. Prager on the strength of wooden spars described by him at the Fourth International Congress for Applied Mechanics at Cambridge last summer.

Wood in compression departs widely from Hooke's Law, and it is this fact which causes such discrepancies between practice and the simple theory of bending as (1) the fact that the modulus of rupture determined by bending is not the same as the ultimate compressive strength of the wood; (2) the fact that the modulus of rupture is not a characteristic of the wood alone but is a function of the form of the cross-section of the spar; (3) the fact that in practice wide spars are not more efficient than narrow ones.

Prof. Prager's analysis is delightfully clear and simple, and he gives a graph in the article which enables a rapid determination to be made of the best dimensions of a wooden spar for any given total spar depth and bending moment.

N. A. DE BRUYNE,
Duxford, Cambs. Aero Research, Ltd.

FROM HOLLAND

[3052] Having read the letter of Mr. K. Grant in your issue of June 13, I should like to state the following facts:—

The Douglas D.C.2 machines used by the K.L.M. on the India route, as well as on services in Europe, have a guaranteed cruising speed of 185 m.p.h. and a top speed of more than 200 m.p.h.—not, as Mr. Grant said, an operational speed of 165 m.p.h.

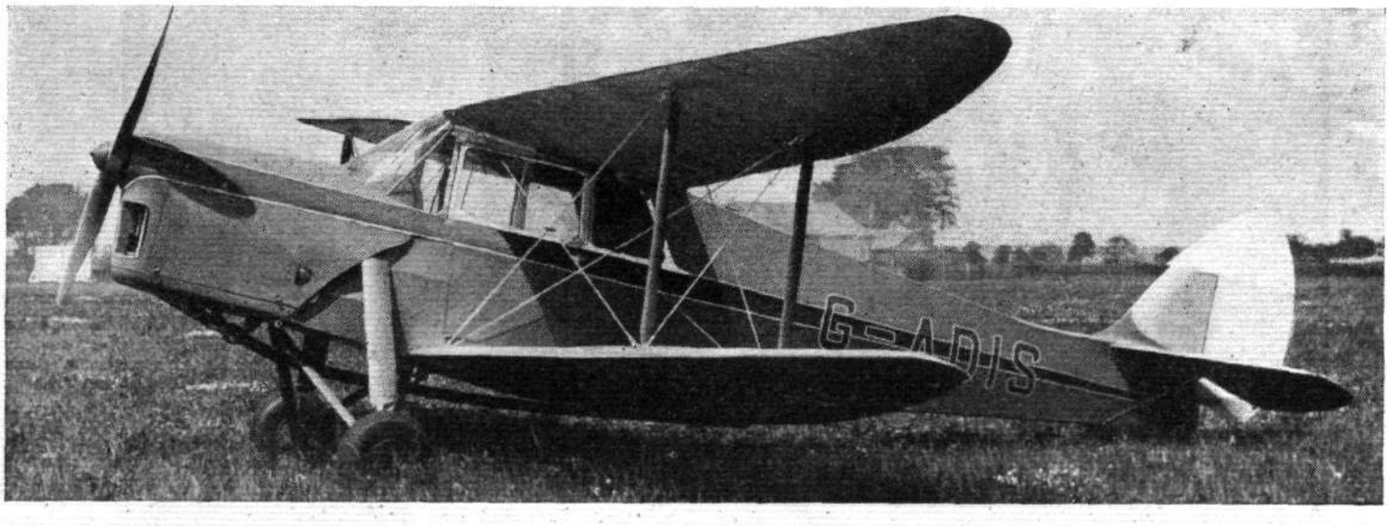
Further, I may mention that the K.L.M. intend to use the Douglas machines for two years only, and then replace them by new aircraft.

Finally, the Postal authorities in Holland have decided to send all letters with European destinations by air mail without any additional cost. F. E. EICHHOLTZ.

Leiden, Holland.

IN BRIEF

Mr. R. K. D. Chelton, of 5a, Woodsome Road, London, N.W.5, states that he is anxious to get into communication with local enthusiasts with a view to the formation of an aeronautical society.



A NEW DE HAVILLAND MACHINE: The "Hornet Moth" (130 h.p. "Gipsy Major") is a side-by-side two-seater. It will be seen for the first time at the S.B.A.C. Display, a forecast of which appears on pp. 698 and 699. (*Flight* photograph.)

COMMERCIAL AVIATION

— AIRLINES — AIRPORTS —

THE WEEK AT CROYDON

Saving the Situation : Back to Nature : Clothes Make the Man : The New Signals Officer : To Arrive is Not to Land

THE week's traffic has been definitely good, especially on D.L.H. and K.L.M. lines. Traffic to Paris rather surprisingly dropped off, but fine weather at the end of the week put the matter right.

Imperial Airways saved the situation in the vital matter of a golf game during the week. One Syd Brews, a South African golfer, arrived at Cherbourg on Wednesday afternoon, where Imperials had a D.H. 86 awaiting him. He was at Croydon shortly after 6 p.m. and caught a train to Edinburgh in record time. This epoch-making spot of hustle gave him three full days' practice before the British Open Golf Championship. And yet the Archbishop of York says we should be much happier without the aeroplane!

Seriously, though, the Archbishop should remember the many times the aeroplane has brought comfort to those hurrying to the side of some seriously ill or injured relative when time was vitally important as well as the people whose lives have been saved by fast transport to a hospital. In any case, I respectfully suggest that he is talking through the archepiscopal headgear. If natural progress had been arrested before the advent of the aeroplane by clerical interference, church dignitaries might be trundling round their diocese in tumbrils and sailing for their Riviera holidays in coracles.

Air Comdre. E. D. M. Robertson, who, as reported in last week's *Flight*, has been appointed Chief Aerodrome Officer at Croydon.

Surrey Flying Services have acquired a D.H. "Dragon" through Rollasons, Ltd., of Croydon. It is painted a pleasant light blue, and is named *Blue Mist*. The next of the series, I understand, will not be called *Black Fog*. The name *Blue Mist* is that of the late Lawrence of Arabia's famous Rolls-Royce that he used out East during the War.

The Emir Saud and his suite were at Croydon on Friday, when they saw the sights—including the arid potted palms, aspidistras and second-hand carpets with which the Main Hall is always made to look like an oriental interior in amateur theatricals.

The Saudi Arabians are tall, slender, bearded men in graceful flowing robes and dignified headgear. The officials who welcomed them were clad in subfusc garments and that near-black "inverted bowl we call a hat," which, at Croydon, is seldom improved by a hearty dusting from the draught of some departing machine. Why, by the way, are there only two sizes of bowler hat—the size for men with small heads, designed to rest on the ears, and the other size for large headed folk, balanced on the top of the head and seeming to need a large hatpin or two?

Capt. Olley reports no startling flights, but lots of bread-and-butter flying, and Cobham Air Routes tell me that they have bookings for months ahead on the Guernsey route. The Airspeed "Envoy" is doing good work on that line, its speed being much appreciated. Croydon-Bournemouth is regularly flown in 30-35 minutes, and it *has* been done in 21 minutes. Provincial Airways notice an increase in the number of business passengers, who use their services for business trips —returning on the same day. I imagine, too, that business is fairly brisk with Comercial Air Hire, because when I asked for the week's news they were all too busy to give me any.

This appears to be a good moment to congratulate our old friend Mr. Sweeney, of Air Ministry "Signals," on his appointment as Signals Officer at Croydon, where he is now installed. His full address is Signals Officer, Signals Department (Civil Aviation), London (Croydon) Air Port, Croydon, Surrey, according to a recent "Notice to Airmen," so if you want to send him a six-penny telegram any time it will cost you a shilling.

The Sunday Times of 100 years ago announced a proposal to journey from London to Paris by balloon in the short time of four or five hours. It is very gratifying to contemplate the progress we have made. Some of our aeroplanes, if interfered with by the contrary winds, have equalled this record or even surpassed it.

A Sunday newspaper is all agog about a five million pounds' scheme for an airport built over Cannon Street Station. The London County Council is going into the matter with "experts." Air traffic companies, when asked their opinions, replied, tongue in cheek, that if the scheme proved practicable they would co-operate. If the companies are not the experts in such a matter who are? The question is worth asking, because the L.C.C. has earmarked £750 to pay for "expert advice." Advised, doubtless by one of these "experts," the newspaper triumphantly remarks, "Critics of the scheme point out that in a typical London fog the platform would be useless," but that "the radio beacon used in America . . is the answer to that." Truly, a little knowledge is a dangerous thing. To arrive, in fact, is not to land.

Anyway, I wish everybody concerned lots of jolly luncheons and things with the voted cash.

Two of last week's more interesting arrivals at Croydon were Herr Wolfgang von Gronau, in a Heinkel, and Fraulein Elly Beinhorn in a Messerschmitt. The former will be remembered for his flights across the very North Atlantic. A. VIATOR.

Flying Speeds and Costs

While people complain of the cost of air travel it is interesting to remember that the time taken to travel to Vienna by first-class surface means is 26½ hours and the fare about £19. By Imperials the time is 7½ hours and the fare is £15.

Soviet Airship Service

Later this year, probably in September or October, the Soviet Union is hoping to put a passenger dirigible into service between Moscow and Svendlovsk, a manufacturing town in the Ural mountains. A mooring mast has already been erected at Moscow and the dirigible is the 20-passenger V-6, now under test, which is reputed to have a cruising speed of 75 m.p.h. Not, however, fast enough to deal with some winds one might expect in that part of the world.

Commercial Aviation

Changes at Le Bourget

A new administrative building is to be constructed at Le Bourget. As it is desired to give the building—which, together with the approaches, will probably cost about £100,000—an artistic appearance, the French Air Ministry is offering five prizes for the best designs submitted.

London—Dublin?

Last week in the Dail the Irish Minister for Industry and Commerce stated that a regular service between the Free State and Great Britain would be started next month. The service, which would be experimental, would, he said, be continued throughout the winter to obtain the necessary information. Meanwhile, the Free State was keeping in close touch with the Transatlantic possibilities.

A Hillman Occasion

The several extensions and modifications to Hillman's Airways services, which were fully described in *Flight* of May 30, were given a ceremonial inauguration last Thursday when Lady Cunliffe-Lister christened the first of the company's D.H.86 machines. These twelve-seaters, three of which will eventually be delivered, will be used exclusively on the four daily Paris services, and the first was named *Drake*.

It will be remembered that the new Hillman system includes two services daily to Belfast and Glasgow, three to Brussels *via* Ostend, one between Hull, Manchester, Liverpool, and Belfast, and a ferry service between Ramsgate and Ostend, which will be started just as soon as Ramsgate's airport is ready.

After the ceremony, at which Sir Alexander Harris, the chairman, presided, the machine was flown over to Paris by Capt. W. F. Anderson, Hillman's chief pilot, carrying, among other well-known people, Lady Cunliffe-Lister, Group Capt. Primrose, Mr. and Mrs. McGrindle, and Brig.-Gen. Groves.

Lady Cunliffe-Lister christens Hillman's first D.H.86. Capt. T. N. Stack can be seen, with the chief pilot, Capt. Anderson, beside him, standing beneath the nose.

At Brussels the President of the Association of Belgian Travel Agencies, Mr. Guertz, made some apt remarks in his speech at the Brussels inauguration. After speaking kindly of Great Britain, of her influence on world sanity, and of Belgium's own operating company, he said that reciprocity in international travel was absolutely essential. The new service, he said, answered a very real need, and the travel agencies, probably responsible for the movement of tourists throughout the world, wished it the best of success.

Nothing new, he went on, could be attempted without taxes and an excessive number of rules and regulations, but the aeroplane was surmounting the effect of hampering restrictions.

Christchurch

Full customs facilities are now available at Christchurch aerodrome, Bournemouth, which lies about 1¼ miles E. by S. of Christchurch.

Heston Extensions

Between forty and fifty acres are being levelled and sown at Heston and will be added to the landing area next spring. This will bring the total space available up to about 150 acres.

One or two people are awaking to the fact that the Inner Circle Air Line's service is the best value in joyrides to be obtained anywhere near London. The other day a party of sixteen travelled from Croydon to Heston and back on this line, which used for the occasion an Avro 642 instead of the customary Monospars. They did it "just for the ride."

To Le Mans

Wrightways carried three "Dragon"-loads to the Le Mans races a fortnight ago, using their own machines and borrowing one other.

Incidentally, the early morning newspaper pilots, Duggan and Turner, are not having too happy a time in this flaming June of ours. At least twice during recent weeks it has been necessary to come into Le Bourget on D/F bearings almost to a blind landing, yet the winter operations passed without incident. The company has engaged another radio operator.

Out from Yorkshire

United Airways are now running a daily service from Leeds and Bradford (Yeadon) to Blackpool, connecting with the Isle of Man service. The machine, a Spartan "Cruiser," leaves Stanley Park at 11 a.m., and Yeadon at 12 noon.

Two "Rapides," incidentally, are now in service, and three more are on order. The four "Cruisers" are at present used on all services but the direct one between London and Blackpool.

Co-operation

According to a recent report from Berlin, D.L.H. and Air France are to co-operate in the matter of South Atlantic services for mails. The service will eventually be bi-weekly, the German service leaving Berlin on Wednesday and the French service leaving Paris on Sunday.

In future the *Graf Zeppelin* will not carry mails.

The idea of a South Atlantic pool between the two operating companies was, we believe, considered at a very early date, but did not receive the sympathy of the French Government.

Between the Islands

Guernsey Airways—an associated company of Jersey Airways and a subsidiary of Channel Island Airways—are now running three daily services each way between Jersey and Guernsey. The machine in use is the Saro "Windhover" amphibian already mentioned in *Flight*, and at least one of the services, which vary, of course, according to the tides, connects with the mainland service in either direction.

The machine takes off from the beach at St. Helier and lands in or near the harbour at St. Peter Port, and the fares are 18s. return and 12s. single, with a free luggage allowance of 25lb.

The Jersey Airways' new "Rapide" is now in service, and is used in transporting passengers from Heston to Southampton or as an "extra" on the island service. The majority of the passengers to Jersey travel by air from Southampton, where the 86s are normally kept and maintained.

New Provincial Services

On July 1 Provincial Airways are inaugurating new Continental services southward from Nottingham and Leicester to Paris and Le Touquet. Each service will be operated daily on week-days, and the Le Touquet service will also run on Sundays.

The service will run, so to speak, in three parts, one "Dragon" carrying passengers from Nottingham to Croydon and two others running to Le Touquet and Paris. Both services will leave Nottingham at 8.30 a.m. and Leicester at 8.45, so that useful time can afterwards be spent in either Le Touquet or Paris, whence machines leave at 4.45 p.m. and 3.30 p.m. respectively.

The fares, which include road transport to and from the aerodromes, are: Nottingham-Le Touquet, £4 10s. single and £7 10s. for a period return; and Nottingham-Paris, £6 10s. single and £11 for a period return. The fares from Leicester are, of course, a few shillings lower. Period returns are available for one month, and the "Dragons" will carry a radio operator.

To Ostend

Sabena's Ostend and Le Zoute service will start on June 29—six days earlier than was originally planned.

Long-distance Radio

During its trip to Egypt, Misr Airwork's new D.H.86 with Mr. Denman acting as operator, got into communication with the Misr Shipping S.A.E. vessel *El Nil*, and sent greetings. A telegram, forwarded from Heston, reached the aeroplane while flying over Corfu—through the good offices of the Brindisi wireless station. Good ranges generally were obtained with the wireless equipment, the best being Cairo at 600 miles, when weather reports and so forth were received just after leaving Athens.

Extension to Money Order Service

The air mail Money Order service has been extended to the Dutch East Indies, Gambia and New Zealand—including Chatham Islands, Cook Islands, Fanning Island, Penrhyn Island, Samoa (Apia) and Savage Island. In addition to poundage at the ordinary rate for Imperial and Foreign Orders an air mail Money Order fee will be payable on each order irrespective of its amount.

The service has also been extended to Zanzibar.

An Imperial Film

The Gaumont-British Picture Corporation have commenced preparatory work on a new film with the Imperial route from Croydon to South Africa as background.

From Charles Lorne's novel, "Air Liner," the film deals with a group of passengers in an England-Africa machine, covering the route and working schedule of the service. Imperial Airways are co-operating and placing machines of the "Hannibal" and "Atalanta" classes and numerous smaller craft at their disposal.

In order to make preparations for the film, Mr. R. B. Wainwright, A.F.C., an ex-R.A.F. pilot, left recently by air for Capetown. Mr. Wainwright, associate-producer of the film, will have the task of transporting artistes and technicians, with the film equipment, to Capetown, whence the unit is following the air-route across the continent.

Survey in New Guinea

An important contract for the air survey of their oil concession areas in Dutch New Guinea—covering some 40,000 square miles—has been given by the Netherlands New Guinea Petroleum Company to the Royal Netherlands Indian Airways (K.N.I.L.M.). Photographs on different scales will be taken of the entire concession area, and it is expected that they will provide the geologists with valuable information.

H. Hemming and Partners, Ltd., who have recently completed an extensive air survey in Western Australia and some work in the Mandated Territory of New Guinea, have been retained by the K.N.I.L.M. in an advisory capacity. They are at present undertaking air reconnaissance and air transport operations in the adjoining territory of Papua.

In Dutch New Guinea preparation for the survey is already in progress. Landing grounds are to be laid out near Sorong, Seroei (Island of Japan), and Babo (MacCluer Bay). A fourth aerodrome will probably be constructed near Mimika.

Brighton's Control Officer

Mr. A. G. Barrett, late of the Airwork, Ltd., has been appointed control officer at the new municipal airport of Brighton, Hove and Worthing, which will be opened on July 20.

Parcel Service to Nyasaland

An air parcel service to Nyasaland has been introduced. The parcels will be conveyed by the South African air mail service and will be due to reach Blantyre nine to twelve days after despatch from London. The latest times of posting at the Head Post Office, London, E.C.1, are 9 p.m. on Tuesday and 8 p.m. on Saturday, and correspondingly earlier elsewhere.

London-Lisbon Service?

Just over eight months ago—on October 20, 1934, to be exact—the air line between Lisbon and Tangier was inaugurated, as duly reported in these pages at the time. Aero-Portuguesa Limitada have now given us details of the workings of the line over the period from October 14 to May 31. During the week October 14-20 the line was on trial.

During the first seven months of operation, seventy-two return trips Lisbon-Tangier-Lisbon were made as against the sixty-six provided for, using the one machine—a Fokker F.7b.-3m. (three Gnome-Rhone "Titan" engines). A total of eighty-three passengers were carried, composed of forty Portuguese, thirty French, four British, two Germans, two Dutch, one Spaniard and four assorted nationalities. The total weight of correspondence carried was 244 kilos, but no registered postal packets were handled. Tangier is 285 miles from Lisbon and the time allowed for the trip, in either direction, is three hours. Generally it is done in a little over two hours and a half.

During the time the service has been operating no connections with Air France machines at Tangier have been missed and there has been no trouble of any kind.

Aero-Portuguesa Limitada (the operating Company) is now in consultation with the authorities with the idea of including Seville in the route, while a Lisbon-Madrid line is also being considered. When this starts it will link up with the Madrid-Paris line and so one will be able to go by air from London to Lisbon by normal air services.

A much better route, and one likely to attract more traffic, would be Paris-Biarritz-Oporto-Lisbon, but until the question of a suitable aerodrome at Oporto is settled it does not look like being realised, although the run Biarritz-Lisbon should present no difficulties to modern passenger-carrying aircraft with present-day ranges. Until passenger services to South America become a matter of regular fact, one would imagine that a fast service between London and Lisbon, *via* Paris, would be well patronised, as it should be possible to do the run to Lisbon in one day (or one and a half at the outside) and so enable business men to have an extra one and a half to three days in their offices and yet catch the same steamer at Lisbon in which, in existing conditions, they would embark at Tilbury or Southampton. It would also attract considerable traffic from Germany. The distance between Biarritz and Lisbon is appreciably the same as that between Croydon and Basle, so it is not impracticable.

Quite recently, incidentally, the D.H. "Comet" *Salazar* did the trip Hatfield-Lisbon in 6 hr. 5 min.

ON THE MARSEILLES SERVICE: One of the new Potez 62 monoplanes which are being used on Air France's Paris-Lyons-Marseilles run, reducing the time for the journey by half an hour. The machine carries fourteen passengers and a steward.

THE POWER in FRONT

Interesting Features of the Engines Fitted in the Aircraft at the Display

ALL the efforts of the finest brains will not produce good aircraft if the engines are unreliable or fail to produce their advertised power. We in England are blessed with engine designers every bit as good as our aircraft designers, and the result is some of the finest flying machines in the world. Our military aircraft are second to none; but, after seeing the magnificent Display which is staged every year at Hendon, and which is but the culmination of the year's training of the Royal Air Force, people are often apt to forget that mechanism which provides the power and makes the display possible. Below we give brief details of the units which will provide motive power at Hendon next Saturday.

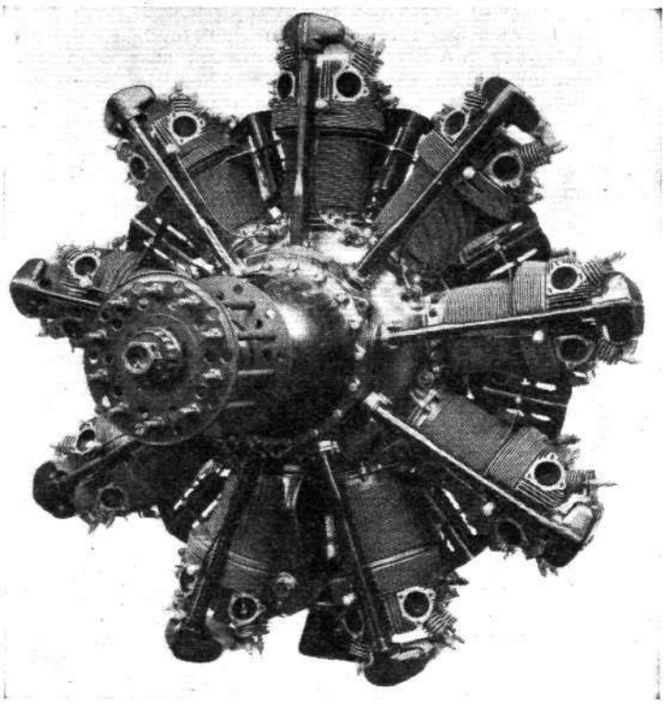
Armstrong-Siddeley Radials

With one of the most varied ranges in use, the Armstrong Siddeley engines run from the "Tiger VI," a fourteen-cylinder two-row engine of 760/810 h.p. at 5,000ft., down to the "Civet I," a small seven-cylinder engine of 140/153 h.p. at sea level. All in this range are air-cooled radial engines, and many use the same cylinders, the power being varied by the number. Between these two engines we have the 525 h.p. "Panther IIa," a smaller version of the "Tiger," with the same number of cylinders; the "Jaguar IV," another fourteen-cylinder engine of 400 h.p.; the "Serval I," a double-row ten-cylinder engine of 340/368 h.p. in its ungeared form; the "Cheetah VI," whose seven cylinders in a single row give 272/290 h.p. at 6,000ft.; and finally the "Lynx IV," with seven cylinders, much like the previous engine, but giving only 215 h.p. at sea level. Those of this range which are geared have an epicyclic type of reduction gearing.

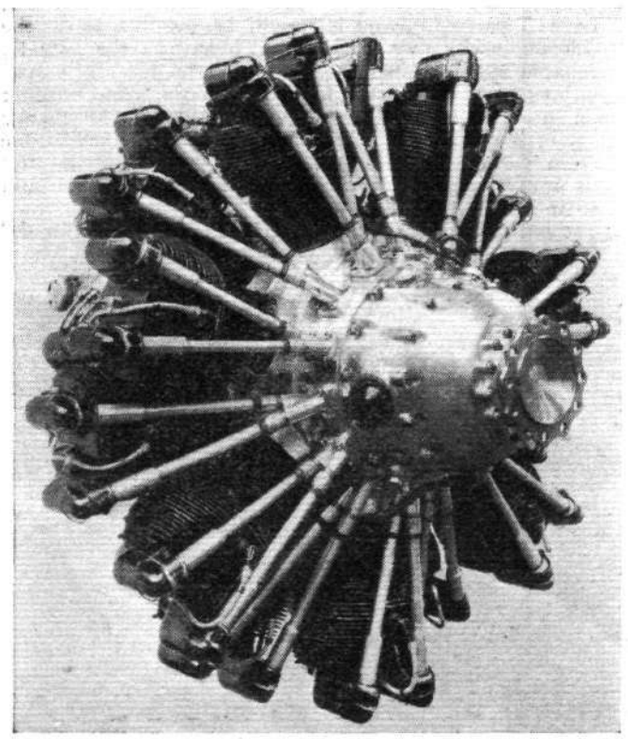
Bristol Types

The Bristol Aeroplane Company's designs are concentrated on single-row air-cooled radial engines with nine cylinders of large bore. The "Jupiter," which has done so much to establish the name of Bristol, is represented by the VIIFP and the VIIIF engines of 490 h.p. at 8,000ft. and 480 h.p. at sea level respectively, the latter being geared.

Of the more recent engines there are the "Pegasus IM3, IIM 3 and III"; the first is the original of the type with an output of 555 h.p. at 4,000ft., the second is medium supercharged and designed to operate on fuel of 77 octane value—its power is 580/635 h.p. at 6,500ft.—and the final engine of the type uses 87 octane fuel and has a power 690/750 at 4,750ft. The "Mercury VIS" is a highly supercharged engine of very compact design intended for high-altitude fighters and similar military aircraft; its output is 605/645 h.p. at 15,000ft. All engines in this range are geared with the Farman-type reduction gear and approach very closely the oft-quoted ideal of 1lb. per h.p. in weight.



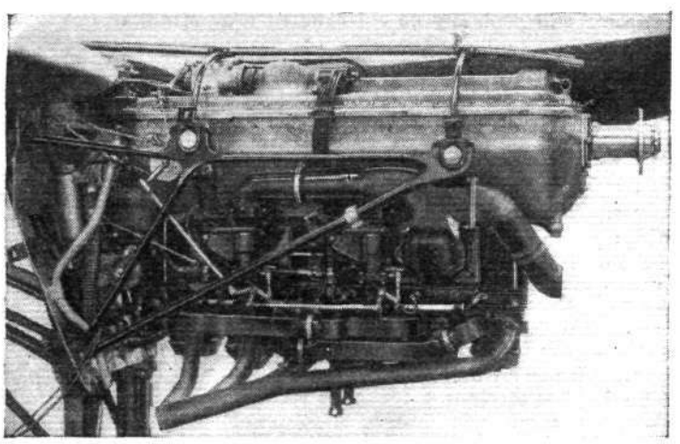
The Bristol "Pegasus III" 690 h.p. geared and moderately supercharged nine-cylinder radial uses fuel of 87 octane number.



A fourteen-cylinder two-row radial using fuel of 87 octane number, the Siddeley "Tiger VI" gives 760 h.p.

De Havilland Racing Engine

The D.H. "Comet," which has been acquired by the Air Ministry and is being demonstrated at the Display is, of course, powered with the specially developed "Gipsy Six R."



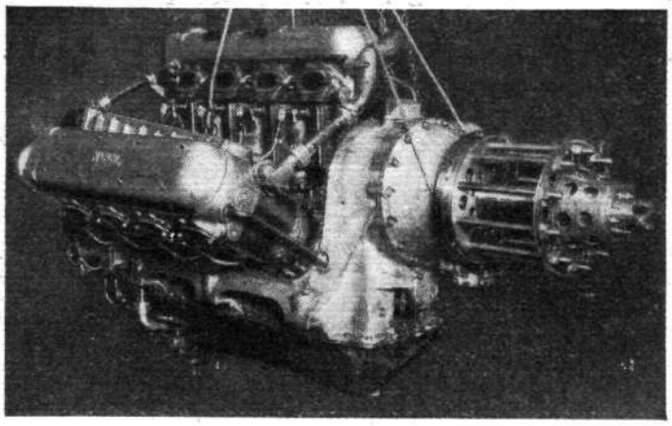
Two De Havilland "Gipsy Six R" engines are fitted to the "Comet." This type, a development of the standard 200 h.p "Gipsy Six" inverted in line air-cooled type, gives 224 h.p.

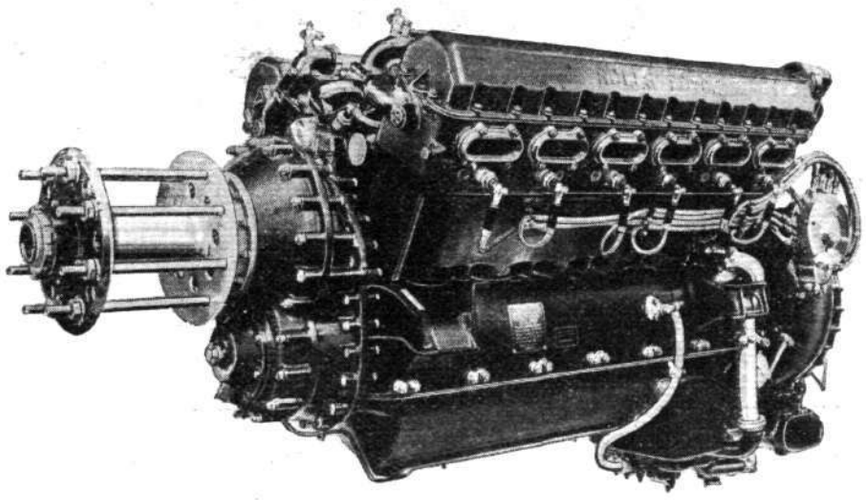
—a racing version, or, as one might say in popular parlance, a hotted-up version, of the ordinary "Gipsy Six."

It is a six-cylinder air-cooled engine with the cylinders inverted and mounted in a straight line. It was designed to operate with a variable-pitch airscrew—without which the "Comet" would not have functioned satisfactorily—and gives 224 h.p. at sea level. For fuel economy and because of the short time available before the England-Australia Race, it was decided to leave it unsupercharged.

Napier

Though modern Napier engines (e.g., "Dagger") are fitted to certain Service aircraft, the sole representative of this old-established firm at the Display is the Napier "Lion," a water-cooled twelve-cylinder engine built on the broad arrow arrangement. It was produced in large quantities just at the end of the War, that is, towards the end of 1918, and rapidly established itself as one having the highest output for the lowest weight. Various geared and ungeared versions have been used as well as supercharged and normally aspirated types; the Type V seen at Hendon in the Vickers "Virginia" develops 450 h.p. at sea level.





(Above) The 450 Napier "Lion" water-cooled "broad arrow" type used in the "Virginias" has become one of the best-known engines in the Service. Its days are numbered, but the Napier company has come forward with a line of magnificent air-cooled in-line types. (Left) A twelve-cylinder water-cooled type, the 525 h.p. Rolls-Royce "Kestrel IIS," is employed in single-seater and two-seater fighters. The weight is 922 lb.

Rolls-Royce Engines

Aero engines built by this well-known firm are of the vee twelve-cylinder water-cooled type. They need little introduction and have been standard in the R.A.F. for a great number of years.

The "Kestrel" series includes the types I B, II MS, II S and III MS, which have outputs of 525 h.p. at altitudes of 1rom 3,000ft. to 11,500ft., and all are geared. The "Goshawk" series resemble the "Kestrel" very closely but incorporate new features, of which perhaps the most interesting is the cooling, which may be described as evaporative, as it is accomplished by steam rather than water, a condenser replacing the better-known radiator. Models to be seen at the Display are the I and VIII; these give 600/650 h.p. at 15,000ft. and 660/755 h.p. at 3,000ft. respectively; both are geared and supercharged.

The last engine of the Rolls-Royce range is the "Buzzard IIIMS." This is a larger version of the other units, with a power rating of 825/955 h.p at sea level. It will be seen—or, more correctly, heard—in the largest flying boat built for military purposes in the world, namely, the six-engined Short R.6/28—which will fly over during the afternoon. The "Buzzard IIIMS" has a number of features developed from the Schneider Trophy engines.

KING'S CUP RACE DETAILS

SEVERAL points of interest relative to the King's Cup Race were discussed when the Racing Committee of the Royal Aero Club met on Wednesday of last week.

In order to meet the objections raised against the long sea crossing between Newtownards and Blackpool additional turning points have been made at Stranraer and Dalbeattie. The turning points at Southampton (Eastleigh) and Reading have been eliminated.

The Course for the first day, September 6, is now:—

Hatfield	Start.		
Newcastle-upon-Tyne	Turning Point ...	240	miles
Edinburgh	Turning Point ...	90	,,
Glasgow (Renfrew)	Control	41	,,
Stranraer	Turning Point ...	75	,,
Newtownards (Northern Ireland)	Control	30	,,
Dalbeattie	Turning Point ...	80	,,
Blackpool	Turning Point ...	85	,,
Woodford	Control	50	,,
Cardiff...	Control	136	,,
Hatfield (Finish)	Finish	126	,,
Approximately		953	miles

The prizes of £1,000 presented by Viscount Wakefield are allocated as follows: 1st, £500; 2nd, £200; 3rd, £100: subsidiary prizes, £200.

The subsidiary prizes include £50 each for the best time accomplished in the Eliminating Contest in classes A and B, and £100 divided amongst others qualifying for the final.

The entry fee is £10, and must be paid to the Royal Aero Club, 119, Piccadilly, London, W.1, not later than 5 p.m. on July 15th. Late entries at double fees will be received up to 5 p.m. on July 30th. Entry forms, complete with all particulars, must be received by the Club not later than 5 p.m. on July 30th.

Subsidy for Gliding

It is reported that the Air Ministry has decided on the terms of the grant to be given to assist gliding.

Allowances to clubs will be based on the percentage of outlay on purchased capital assets—such as land, buildings and machines.

The total amount of the subsidies is not to exceed an annual aggregate sum of £5,000. Grants will be made only to approved clubs.

Bellanca-building at Speke?

A definite decision is expected to be made in a few days' time as to whether or not the Liverpool Airport is to be made the site for an aeroplane factory under the ægis of the Bellanca Corporation. Mr. O. Hansen, acting for the Bellanca Corporation, was last week in consultation with Alderman J. G. Paris at the office of the Land Steward and Surveyor, Mr. Albert Jenkins.

The new Monospar S.T.25. (*Flight* photograph.)

STANDARDISED EQUIPMENT

New Monospar S.T.25—the Jubilee Model—to be Sold Only with Standard Accessories

WHAT may be described as an attempt by a British aircraft manufacturer to deal in aeroplanes on motor car lines was inaugurated by General Aircraft, Ltd., at Hanworth Air Park, on Wednesday of last week.

There really seems little reason for treating the purchasers of what are commonly called private aeroplanes any differently from the purchasers of cars. Both want the price cut as low as possible, and this can only be done by standardising the article and its equipment, the degree to which the price can be lowered thereafter resting on the numbers which are produced.

Cars are turned out in hundreds of thousands, but aeroplanes—that is, a production batch of one type—are still only laid down at the most in a few hundreds. Hitherto, purchasers of aeroplanes have usually been sold a stripped article for which they have had to buy, as extras, many of the essential instruments and fittings, and, naturally, there has been a great deal of grumbling, because they felt that they ought to be given these extras as standard fittings. It was, however, impossible to do this while the purchaser was allowed to have all his own fads and foibles incorporated.

The new plan of General Aircraft looks like putting this phase of the business on a sounder and more rational footing.

The S.T.25, or "Jubilee Model," is being built as a standard article, with standard equipment, and the price has been fixed so low that the machine offers excellent value. Presumably, purchasers will be able to have the equipment varied, but in that case they will have to pay what those alterations cost—a far greater sum than any of them will believe possible, but which is undoubtedly justified when one considers the disorganisation of production which such special work involves.

This standardisation of equipment does not mean that anything has been skimped; in fact, the equipment is in some respects more complete than that normally provided. For example, among the features listed are: cabin engine-starting gear (which we know from personal test to be thoroughly satisfactory); swing-over control wheel with two-level adjustment on each side and full dual controls; navigation, instrument and cabin lighting; Vickers' landing headlamp; Radio Transmission Equipment radio receiving set, with visible

SPECIFICATION

Areas and Loadings

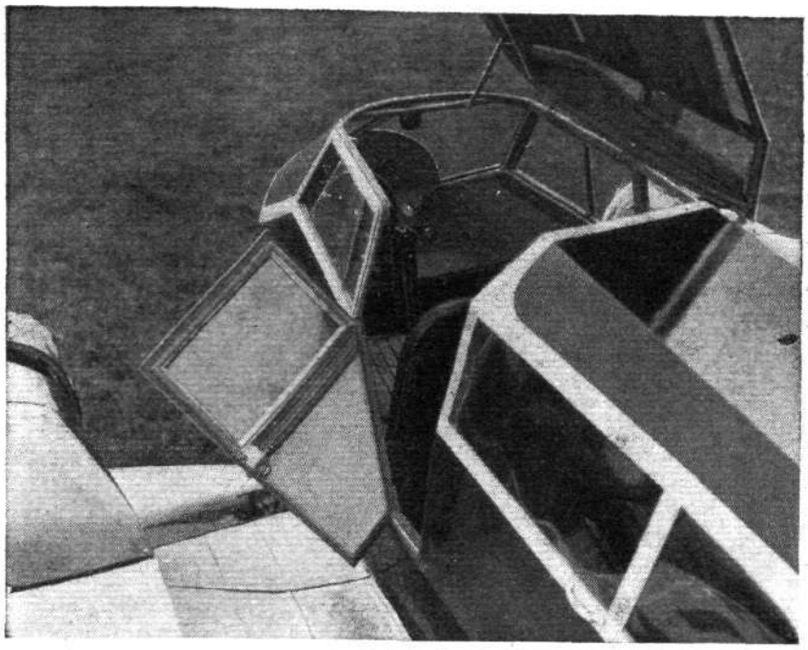
Span	40ft. 2in.	(*12,24 m*)
Span (wings folded)	14ft. 10in.	(*4,52 m*)
Wing area	217 sq. ft.	(*20,16 m²*)
Length	26ft. 4in.	(*8,02 m*)
Height	7ft. 10in.	(*2,39 m*)
Wing loading	13.25 lb./sq. ft.	(*64,69 kg/m²*)
Power loading	15.98 lb./h.p.	(*7,25 kg/hp*)

Weights.

Tare weight with all equipment	1,680 lb.	(*762,03 kg*)
Fuel—40 gall. (*181,8 l*)	291 lb.	(*131,99 kg*)
Oil—4 gall. (*18,2 l*)	39 lb.	(*17,69 kg*)
	330 lb.	(*149,69 kg*)
Pilot and four passengers	800 lb.	(*362,87 kg*)
Baggage	65 lb.	(*29,48 kg.*)
ALL-UP WEIGHT	2,875 lb.	(*1 304,08 kg*)

Performance.

Maximum Speed at sea level (at 3,500 r.p.m.)	142 m.p.h.	(*228,5 km/h*)
Cruising Speed at sea level (at 3,200 r.p.m.)	130 m.p.h.	(*209,2 km/h*)
Rate of Climb at sea level	800 ft./min.	(*4,06 m/sec.*)
Absolute Ceiling	16,000 ft.	(*4 876,8 m*)
Service Ceiling	14,000 ft.	(*4 267,2 m*)
Range of Cruising Speed	585 miles	(*941,5 km*)
Take Off (in still air)	95 yards	(*86,9 m*)
Landing Run (with partial braking)	120 yds.	(*109,7 m*)
Landing Speed	52 m.p.h.	(*83,7 km/h*)



The view above shows the cabin door arrangement; the new curved screen is also visible. (Right) When the new Monospar made its first public appearance; Sir Maurice Bonham-Carter (Chairman of the Company) is seen making a presentation to Mrs. Shelmerdine, with Mr. Noel Brown (Secretary) standing by. (*Flight* photographs.)

homing device; choice of two colour schemes; fire extinguisher; sunblinds; Palmer hydraulic wheel brakes on Palmer wheels with medium-pressure tyres; Smith's turn indicator, and pitch indicator; Husun compass; time-of-trip clock; Air Log; and the usual very full range of instruments.

On the top of all this, the new Pobjoy "Niagara II" engines are supplied with the makers' full guarantee, which specifies the cost of overhaul and maintenance for a period of 800 hours or two years, whichever is the shorter, in the case of a private owner, or 2,000 hours or two years in the case of a commercial user.

So much for the equipment, which really speaks for itself. The machine does not differ radically from the S.T.10, except that the cabin has been arranged to accommodate five persons. The fifth seat has been built in behind the divided rear seat in such a manner that the back of it can be folded down, when not in use, to form additional luggage space. This seat is comfortable—even for the writer, who is probably somewhat more bulky than the average; it does not perhaps provide a superabundance of leg room, but it should be adequate for anything except very long journeys. The upholstery, the work of Rumbold's, is pleasing, and the results of the sound-proofing are entirely satisfactory. The undercarriage is the fixed Monospar type with a Dowty compression leg. The two alternative colour schemes of black and primrose or red and grey are pleasingly carried out, and the finish is good.

A short trial in the air showed that the S.T.25 handles even better than previous machines. She is beautifully light and the controls are admirably balanced, and, what is equally important, the surfaces are well proportioned, so that side-slipping or turns with ailerons alone are straightforward and can be well controlled. The leading edge of the wings now has sheet metal under the fabric, back to the spar; the smoothness of entry secured by this means has naturally resulted in a cleaner machine aerodynamically and a flatter glide. The angle is, however, steep enough for comfortable approaches without necessitating undue use of the excellent side-slipping qualities. As can be seen from the table of performance figures, the take-off is very good—surprisingly so when one flies the machine for the first time—and the air speed indicator, at any rate, fully substantiated the cruising speed.

The new Radio Transmission Equipment (or R.T.E., as it is more commonly called) receiver and homing device is most interesting. At the present time the production model is not quite ready, but a short trial of the preliminary installation clearly proved—we have been convinced for a long time that some form of homing device would sooner or later have to be used for all serious flying, even by private owners—that a simple apparatus like this can be of the greatest value navigationally. It really has three functions: the reception of weather broadcasts, assistance directionally, and entertainment; and we imagine that now the ice has been broken, so to speak, it will soon become standard on most machines.

Using the Homing Device

There would seem to be little doubt that inexperienced pilots will only get the best out of the apparatus directionally after they have had a reasonable amount of instruction in its use and a fair amount of experience, but this could be arranged as part of the service provided, just as some agents are giving flying instruction to those who purchase aeroplanes, but with the difference that even the inexperienced man will get fair results out of the homing device, and very short instruction will enable him to get the best out of it.

On the occasion of the first presentation to the public of the S.T.25 at the company's works at Hanworth, Mrs. Shelmerdine (Lt.-Col. Shelmerdine, the Director-General of Civil Aviation, was unfortunately unable to be present as well) performed what may be termed the unveiling ceremony, and Sir Maurice Bonham-Carter, chairman of the company, made her a presentation in commemoration of the occasion.

"DRONE" DEVELOPMENTS

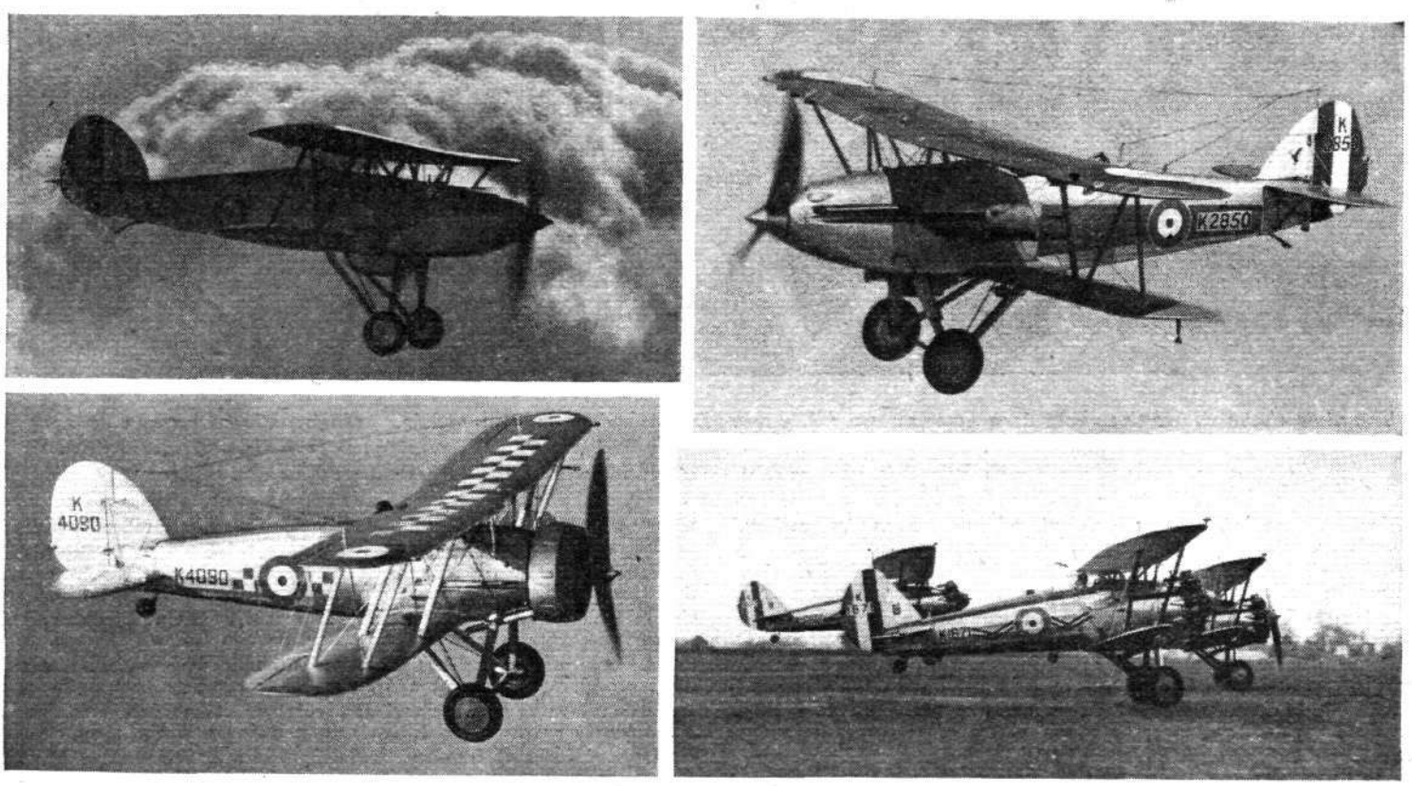
WE recently renewed our acquaintance with the "Drone," that fascinating little aeroplane which can, with truth, be called a light aeroplane. Mr. Kronfeld, who, as readers know, is now manufacturing this machine at Hanworth Park, has not altered to any great extent the model which we flew, but the small modifications he has incorporated have made considerable improvement in the flying qualities.

Of greater interest than these modifications is the new wing which is being built, and which should be ready shortly. On this the ailerons have been increased in area, and this, together with a decided wash-out at the tips, should increase the lateral control and make the "Drone" more responsive generally. Alterations are also being made to the fuselage; this is now built from the beginning as a single-seater instead of being a converted two-seater as hitherto. This will result in a saving of weight and a better performance for the new model.

As a means of getting some fresh air in the quiet evenings, or of making cross-country trips when there is no hurry, the "Drone" is more than admirable. The pilot's position, out in the front, allows him to fly without goggles and yet be able to see everything with ease; the little Douglas engine is not unduly noisy, and from every point of view flying in this type of aeroplane is the pleasantest form of sport we know—unless one wants to get right away from aviation and go fishing!

SERVICE AIRCRAFT at the DISPLAY

A Review of Types which will be Represented in the Major Part of the Programme



A Fighting Group : The "Fury" single seater (top left), like the "Demon" two-seater (top right) is fitted with the 525 h.p. supercharged water-cooled "Kestrel," whereas the "Gauntlet" (bottom left) and the "Bulldog" employ respectively the 605 h.p. "Mercury VIS" and 490 h.p. "Jupiter VIIF" air-cooled radials. The last two are single seaters.

IF a ballot were to be taken among the assembled multitude at Hendon next Saturday on what class of aeroplane in the display impressed it the most, we should probably find that fighters were the most popular. In this class are the fastest aeroplanes used by the Royal Air Force, and the speediest of these and, for that matter, the fastest and highest climber, is the new Gloster "Gauntlet."

This is a single-seater high altitude day and night fighter, and will be seen in the hands of the pilots of No. 19 (Fighter) Squadron. Although a two-bay biplane, that is to say, it has two pairs of interplane struts on each side of the fuselage, it is capable of 230 m.p.h. at 15,800ft., can climb to 15,000ft. in 6.25 minutes, and has a service ceiling of no less than 35,500ft. carrying full service load. The engine is the 605/640 h.p. Bristol "Mercury VIS" supercharged air-cooled nine-cylinder radial, which uses the new "87 octane" fuel, cowled in a long chord anti-drag ring combined with an exhaust collector. Two Vickers .303in. machine guns are mounted in the sides of the fuselage (there is provision for 1,200 rounds of ammunition) and night flying gear, navigation lights, wireless reception and transmitting equipment and oxygen gear form part of the normal service load. Four 20lb. bombs may be carried for attacking ground targets. Service pilots are loud in their praises of the handling qualities of the machine. The main data are: Span 32ft. 9½in., length 26ft. 2in., wing area 300sq ft., gross weight 3,900lb.

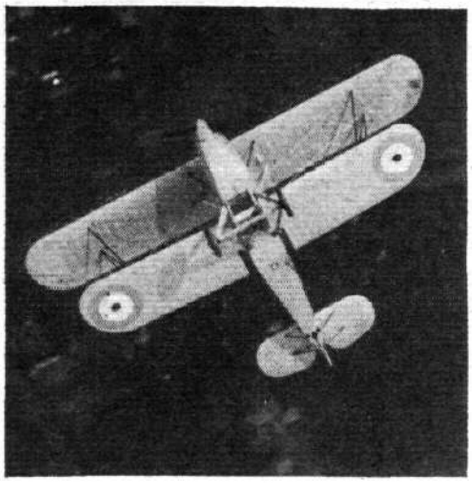
The 'Gauntlet" will eventually replace the Bristol "Bulldog IIA" in certain units, but this latter type is still by far the most common fighter in the Service. It was adopted about five years ago, and is a single bay all-metal biplane powered with a 490 h.p. Bristol "Jupiter VIIF" supercharged nine-cylinder radial. Equipment similar to that of the "Gauntlet" is carried, and the top speed lies between 160 and 170 m.p.h. Squadrons equipped with "Bulldogs" which will be seen at Hendon are Nos. 17 and 3. The "Bulldog" measures 34ft. in span, is 24ft. 9in. long, and has 306.5 sq. ft. of wing area. The gross weight of the Service type is 3,530lb.

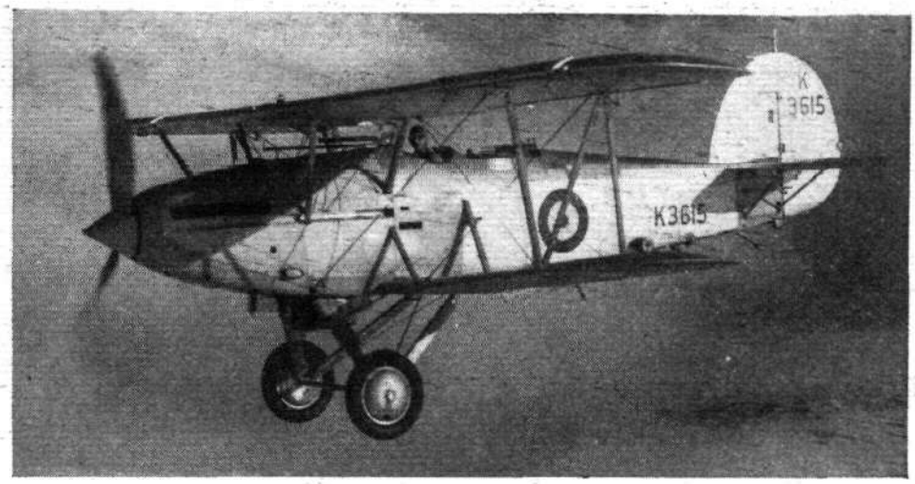
The Hawker "Fury" flown in the Display by Nos. 1 and 25 Squadrons is an "interceptor" type biplane. This means that it does not carry as comprehensive a service load as the "Gauntlet" and "Bulldog"; it was built originally to climb to great altitudes in the shortest possible time to intercept raiding bombers. The "Fury" is by no means new and the speed attained by the standard R.A.F. type fitted with 525 h.p. Rolls-Royce "Kestrel IIS" supercharged twelve-cylinder water-cooled Vee engine—214 m.p.h. at 13,000ft.—is well below that reached by later versions with new types of "Kestrel" engines. The climb to 20,000ft. occupies roughly 9½ minutes, and the armament consists of two Vickers guns in the top cowling. Certain of the "Furies" in Service have wireless equipment. In power dives the "Fury" can reach speeds in the neighbourhood of 400 m.p.h.

A Two-seater Fighter

Until two or three years ago the Royal Air Force had, since the war, concentrated on the development of single-seaters for the equipment of its fighter squadrons, but as the result of experiments with a flight of two-seater fighters known at the time as "Hart Fighters," the "Demon," a development of this latter type was adopted, and is now being used by, and issued to, several squadrons.

Basically the "Demon" is similar to the "Hart" light bomber, but the engine is a supercharged Rolls-Royce "Kestrel," whereas that in the bomber type is at present naturally aspirated. The first "Demon" to be built used, like the "Fury," the "Kestrel IIS" engine, but the latest version now going into service is equipped with the 600/640 h.p.





The Hawker "Nimrod" (left) is a single-seater fleet fighter with the fully supercharged 525 h.p. "Kestrel IIS." A two-seater, the "Osprey" (right) uses a moderately-supercharged "Kestrel" of similar power. (*Flight* photographs.)

"Kestrel V," which uses fuel of 87 octane value. Armament consists of two Vickers guns for the pilot, a Lewis gun on a Hawker mounting over the back seat, and, if necessary, four 20lb. bombs. The rear gun mounting in the "Demon" is specially tilted in order that the gunner may be sheltered in some measure from the airstream. Wireless, night flying and oxygen equipment is carried. The maximum speed of the earlier version is about 185 m.p.h. at 13,000ft., but with the "Kestrel V" over 200 m.p.h. is attained at that altitude. No. 23 (Fighter) Squadron will fly "Demons" at Hendon. The main data are: Span 37ft. 3in., length 29ft. 7in., wing area 347 sq. ft., and gross weight 4,196lb.

In the Headquarters Race will be seen a Hawker "Nimrod" single-seater fleet fighter and an "Osprey" fleet fighter reconnaissance biplane made by the same company. The "Nimrod," used by a number of Fleet Air Arm Squadrons, may be regarded as a development of the "Fury"; it is fitted with the same type of engine—the "Kestrel II S," but has greater wing area (301 sq. ft.), increased tankage, deck arresting gear beneath the fuselage, long exhaust pipes, and night-flying gear. Another external difference is the oil cooler present beneath the engine of the "Nimrod." This is to ensure adequate cooling for the oil during overseas service. Two Vickers guns and four 20lb. bombs form the armament. The latest version of the "Nimrod" has swept-back top planes; stainless steel is widely employed in the structure of some of the more recent versions. A twin float undercarriage may be fitted if desired and slinging gear is incorporated in the top centre section. The maximum speed—192½ m.p.h.—is attained at 13,000ft., the gross weight is 3,555lb., span 33ft. 6in., and length 26ft. 11in.

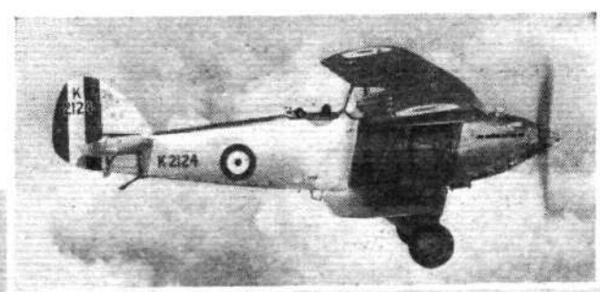
The "Osprey," which, as its official designation denotes, may be employed for fighting and reconnaissance, is extensively used from aircraft carriers and, as a float plane, from the catapults of warships. A moderately supercharged "Kestrel" of 525 h.p., known as the II MS type, is employed, and the armament is two machine-guns and light bombs. External variations from the "Hart," from which the "Osprey" was developed, are the long exhaust pipes leading beneath the lower planes (these are not always fitted), a larger and more rounded fin, deck arresting hook beneath the fuselage, struts from the fuselage to the lower wing roots (the wings are designed to fold), and slinging gear in the top centre section. Loaded to a gross weight of 4,233 lb., the "Osprey" can make a speed of 175 m.p.h. at 10,000ft.; the wing area is 346 sq. ft., span 37ft., and length 29ft. 7in.

Perhaps the best known and probably the most versatile machine in the Royal Air Force to-day is the Hawker "Hart," a light bomber which forms the basic design for the "Demon," "Osprey," "Audax," "Hind" and "Hardy" types.

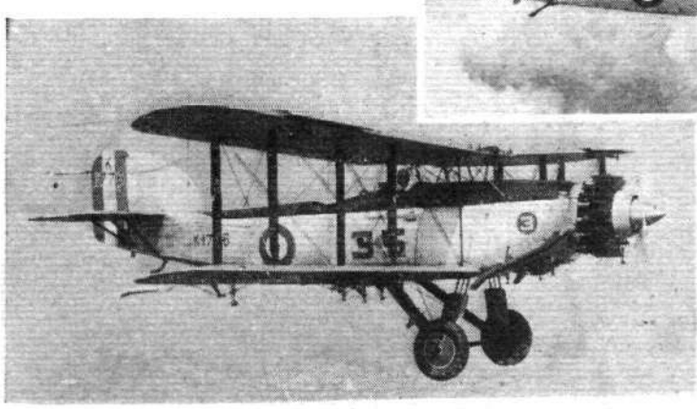
A biplane with staggered wings of unequal span and chord, the "Hart" is a two seater with a single 525 h.p. Rolls-Royce "Kestrel IB" 12-cyl. water-cooled unsupercharged engine. About 500lb. of bombs are carried on racks beneath the lower main planes and fuselage. The pilot is equipped with a single Vickers gun on the port side of the fuselage, and the observer is armed with the customary Lewis. When "clean" the machine will do approximately 180 m.p.h., but when bombs and other external resistances are added this figure is somewhat reduced.

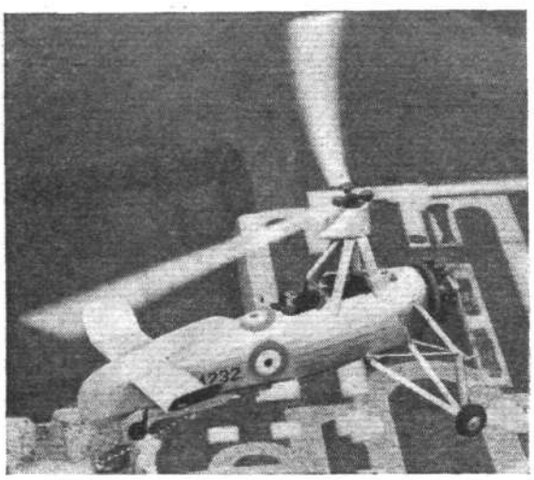
Certain R.A.F. Squadrons employ the "Hart" as a dive bomber—in this work the whole machine is aimed at the target in a steep power dive and the bombs are released when the sights are on—attaining over 300 m.p.h. The gross weight of the "Hart" is 4,620lb. and the wing area 347 sq. ft.; the machine measures 37ft. 3in. in span, and 29ft. 4in. long. "Harts" will be flown at Hendon by Nos. 15, 18, 57 and 605 Squadrons.

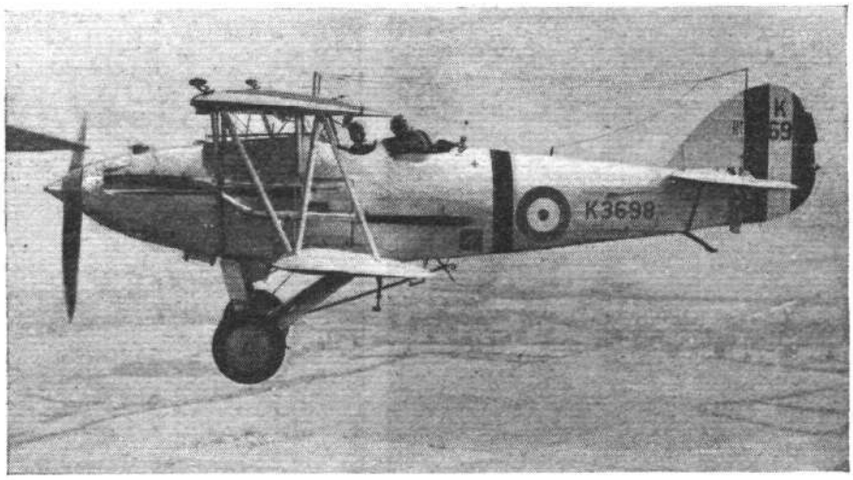
Fastest of the R.A.F.'s bombing types, the Hawker "Hart" (right) uses a 525 h.p. unsupercharged water-cooled "Kestrel."



The Fairey "Gordon" and Westland "Wallace" (bottom, left and right) are fitted with the 525 h.p. "Panther IIA" and the 555 h.p. Bristol "Pegasus IM3" respectively. (*Flight* photographs.)







The "Rota" (140 h.p. "Civet I") has a number of qualities suiting it to army co-operation requirements. A standard type, which equips the majority of army co-operation squadrons, is the "Kestrel"-engined "Audax" on the right. (*Flight* photographs.)

The Westland "Wallace" is a somewhat larger and heavier machine than the "Hart," and was designed as a "general-purpose" type. It is a development of the well-known "Wapiti," an example of which will be seen in the Headquarters Race. Unlike this latter aircraft, however, it is fitted with a 555 h.p. Bristol "Pegasus IM3" geared and moderately supercharged radial. It has a longer fuselage, a redesigned undercarriage, and certain other detailed modifications. Bomb load and armament are generally the same as for the "Hart." There are a few "Wallaces" now undergoing Service tests which have completely sheltered cockpits.

The main data are: span, 46ft. 5in.; length, 34ft. 2in.; wing area, 488 sq ft.; and gross weight, 5,750lb. "Wallaces" will be flown by No. 501 Squadron.

A development of the well-known Fairey IIIF, the "Gordon," a two-seater two-bay biplane general purpose type, uses a 525 h.p. Armstrong Siddeley "Panther IIA" 14-cyl. two-row radial engine which gives it a maximum speed in the neighbourhood of 140 m.p.h. The normal armament for a day bomber is specified, i.e. about 500lb. of bombs, one Vickers gun and one Lewis gun, the latter weapon being fitted to a Fairey high-speed gun mounting. When operating over the desert the machine carries the "general-purpose" load, which includes extra fuel tanks, water and rations, spare wheel and medical supplies. In an emergency the machine may be used as an ambulance.

With full equipment the "Gordon" weighs 5,900lb. It measures 45ft. 4in. in span, is 33ft. 3in. long, and has a wing area of 445 sq. ft.

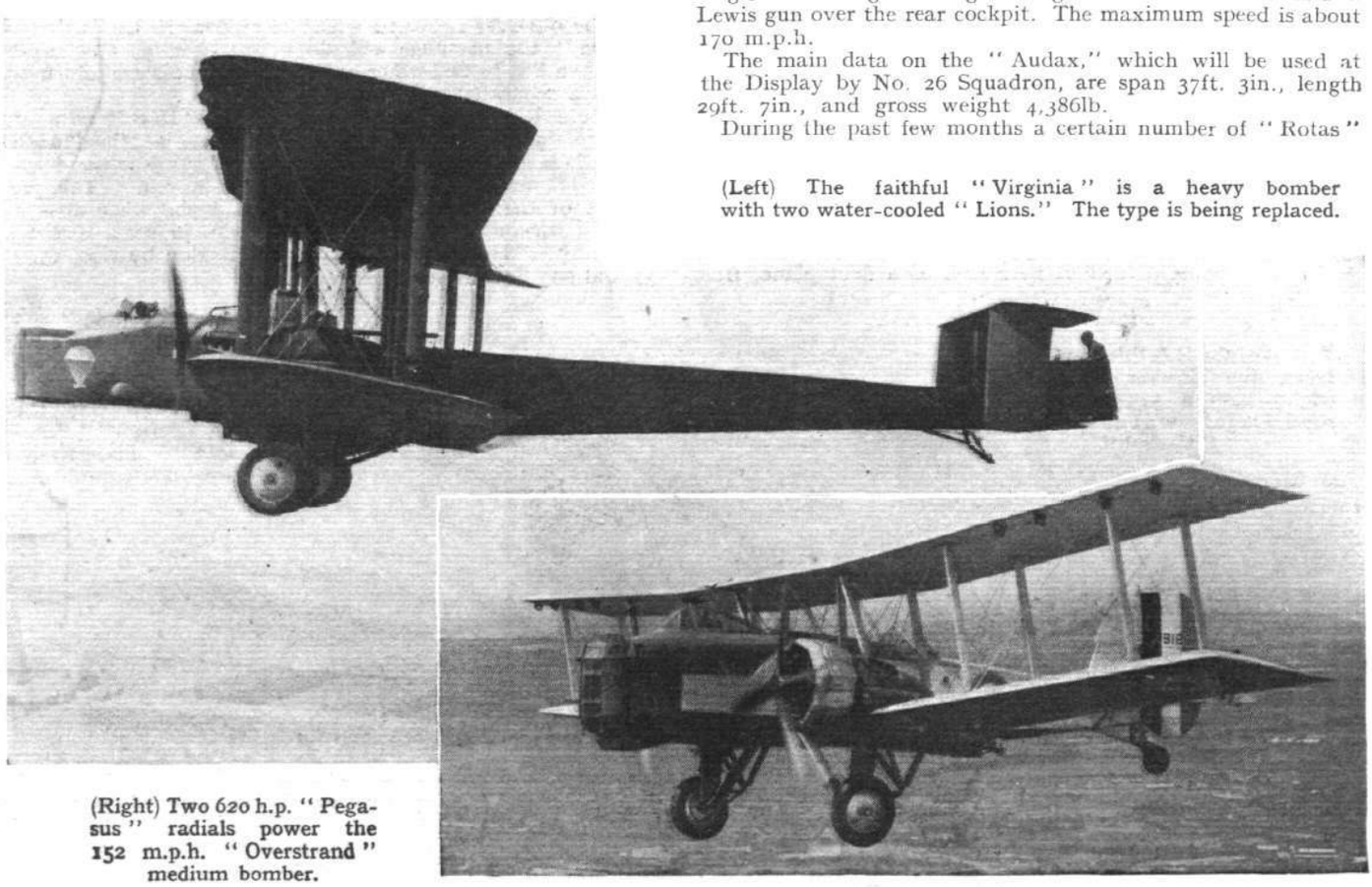
Army co-operation types will be represented at the Display by two machines—an "Audax" and a "Rota." The "Audax," a Hawker product and the latest army co-operation aircraft to be introduced into the Royal Air Force, is yet another development of the "Hart" bomber. It uses a similar engine—the 525 h.p. "Kestrel IB" but may be distinguished from the bomber "Hart" by the long exhaust pipes which run along the fuselage, and by the hook attached to the axle of the undercarriage. This is employed for picking up messages suspended between two poles or, in an emergency, two rifles the bayonets of which are driven into the ground. Complete wireless receiving and transmitting equipment is carried behind the rear cockpit.

If necessary the "Audax" may be employed for bombing, including that of the diving variety. It is armed with a single Vickers gun firing through the airscrew arc and a Lewis gun over the rear cockpit. The maximum speed is about 170 m.p.h.

The main data on the "Audax," which will be used at the Display by No. 26 Squadron, are span 37ft. 3in., length 29ft. 7in., and gross weight 4,386lb.

During the past few months a certain number of "Rotas"

(Left) The faithful "Virginia" is a heavy bomber with two water-cooled "Lions." The type is being replaced.



(Right) Two 620 h.p. "Pegasus" radials power the 152 m.p.h. "Overstrand" medium bomber.

("Rota" is the Service name for the C.30 type of Autogiro) have been introduced into the Service, the object being to determine their suitability for certain phases of army co-operation work. The advantages conferred by the ability of machines of this type to operate from confined spaces and to fly at a very low forward speed are obvious.

A 140 h.p. "Civet I" 7-cyl. air-cooled radial engine, which is actually the 7-cyl. "Genet Major" widely employed in light civil types, is fitted. The maximum speed is 112 m.p.h. but the "Rota" can fly if necessary as slowly as 20 m.p.h. The diameter of the rotors is 37ft., and the gross weight is 1,800lb.

On other pages of this issue will be found a "cut-away" drawing of the Boulton Paul "Overstrand," which type will be represented at the Display by a machine from No. 101 (Bomber) Squadron. The "Overstrand" is a new type of medium bomber developed from the "Sidestrand" familiar to Hendon crowds during the past few years. The main bomb load is stowed in the fuselage "belly," and there are positions for three machine guns. Probably the most outstanding feature of the machine is the power-driven transparent turret in the nose of the fuselage, which enables the front gunner to use his weapon efficiently despite the force of the airstream. The performance, with two 620 h.p. Bristol "Pegasus IIM" geared and moderately supercharged nine-cylinder radials, which, incidentally, are cowled with polygonal Townend rings, is highly creditable for a machine of this type. The top speed is 152 m.p.h., and the manœuvrability exceptional. The wings measure 72ft. in span, and the gross weight is rather more than 11,000lb.

A Veteran Bomber

A heavy bomber which has given long and faithful service is the Vickers "Virginia," which, barring the great Short "Sarafand," will probably be the largest aeroplane in the Display. Powered with two Napier "Lion V" 12-cyl. "broad arrow" water-cooled engines, the "Virginia" will carry a crew of four and roughly 3,000lb of bombs at between 95 and 100 m.p.h.

The type, of course, is due for replacement, and it is improbable that "Virginias" will be seen at many more displays. The gross weight is 17,906lb., and the span is 87ft. 8in.

In June, 1932, the Avro 621, or "Tutor," to give the machine its official name, was adopted by the Air Ministry to replace the famous Avro 504N training machine. The "Tutor" is an all-metal dual-control biplane with wings of equal span, which are heavily staggered in relation to each other in order to provide good overhead view and to facilitate the egress of the occupant of the front seat when using a parachute. Powered with the 7-cylinder Armstrong Siddeley "Lynx" air-cooled radial engine of 215 h.p., which, incidentally, is cowled with a Townend ring, the "Tutor" is capable of 122 m.p.h., and is an extremely fine aerobatic machine. The "Tutors" used in the inverted flying event have only one seat and special petrol feed arrangements to allow their "Lynxes" to operate efficiently during prolonged inverted flight.

The presence of flying boats at the R.A.F. Display at Hendon is always a welcome feature. This year seven of these

The Avro "Tutor" (215 h.p. "Lynx") is the standard training type in the Royal Air Force. (*Flight* photograph.)

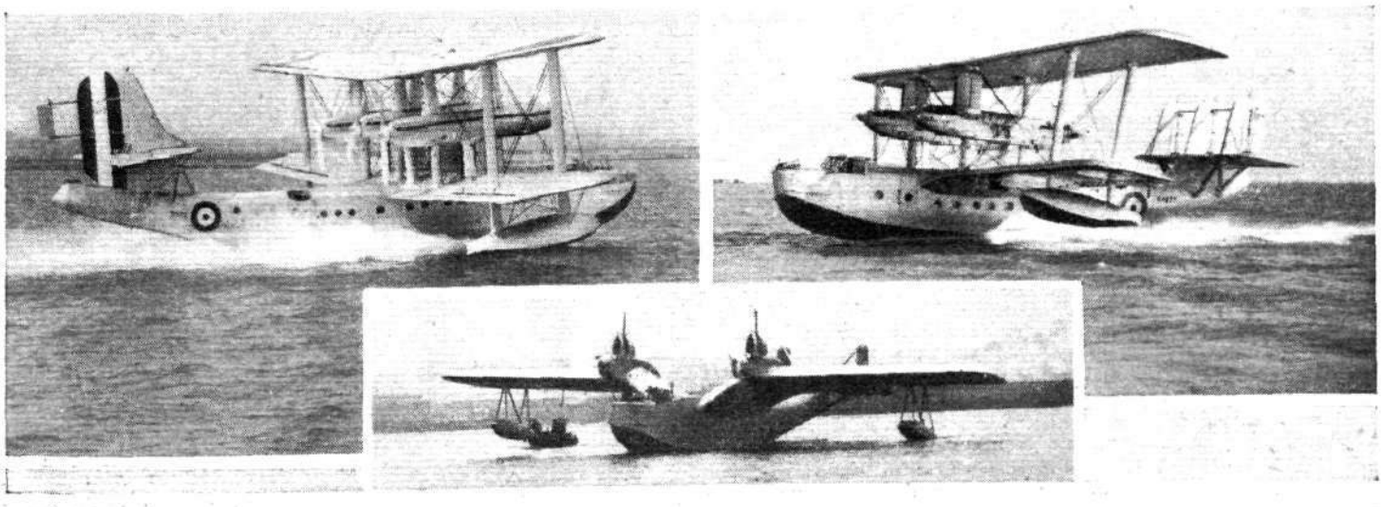
machines will circle the aerodrome and then fly past in line astern before dispersing to their various stations. Three of the flying boats will be Shorts, two Vickers-Supermarine and two Saunders-Roe.

Taking the three Short boats in order of size, the "Sarafand" is a large six-engined multi-seater open-sea reconnaissance military flying boat of all-metal construction. Its six Rolls-Royce "Buzzard" engines (930 h.p. each) are arranged in three tandem pairs between the wings and give the machine a maximum speed of 150 m.p.h. The weight empty is 44,753lb. and the gross weight 70,000lb. With full military load the range is 1,450 miles. The wing area is 3,460 sq. ft. This machine was very fully described in *Flight* of June 13.

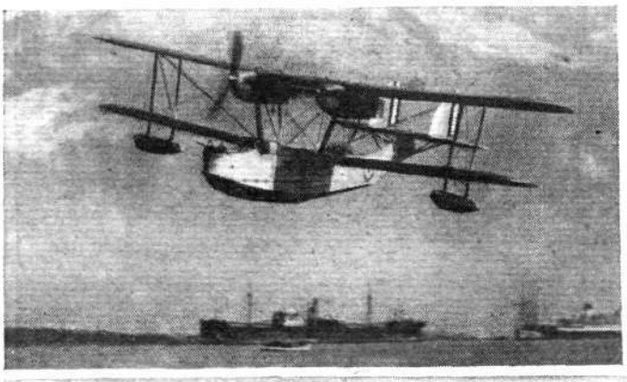
Next in size of the Short boats comes the "Singapore III," which is a four-engined type, with the Rolls-Royce 560 h.p. "Kestrels" mounted in a similar manner. Its wing span is 90ft., the wing area 1,834 sq. ft., the tare weight 18,420lb., and the gross weight 27,500lb. The maximum speed is 145 m.p.h. and the range 1,000 miles.

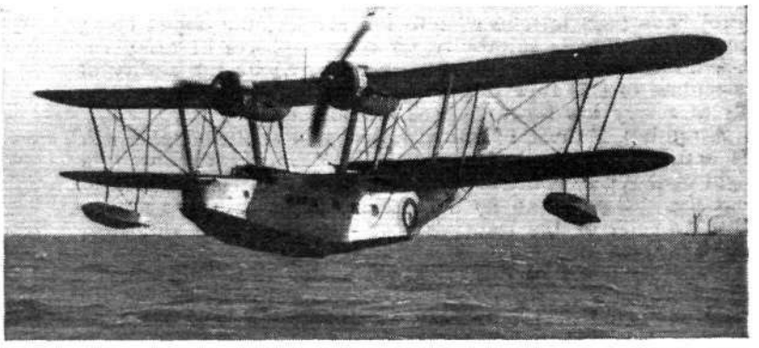
The Short "R.24/31" is a monoplane flying boat of unusual design, the wing roots sloping upwards at a pronounced angle. The two Rolls-Royce "Goshawk" engines develop 775 h.p. each at 5,000ft., and are built on to the leading edge of the wing. The peculiar appearance of this machine has earned for it the nickname "The Knuckleduster." With a wing span of 90ft. and a wing area of 1,147 sq. ft., the machine is a good deal smaller than the other two. The tare weight is 11,720lb. and the gross weight 18,500lb. With a military load of 3,485lb. the range is 980 miles at a cruising speed of 105 m.p.h. The maximum speed is 150 m.p.h.

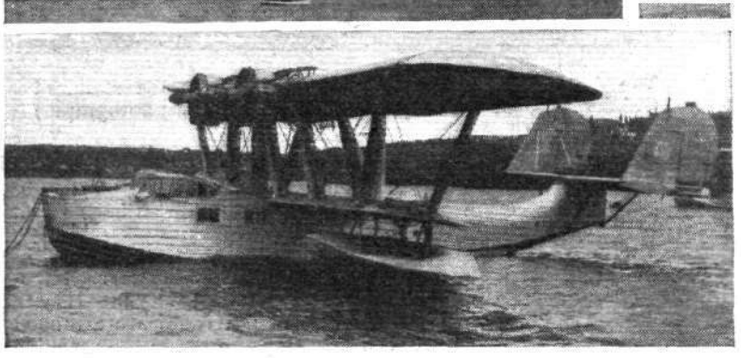
Of the two Vickers-Supermarine types, the "Scapa" is now going into service. It replaces the famous "Southampton," and is a twin-engined flying boat with metal hull and two Rolls-Royce "Kestrel" engines placed closely under the top plane. A crew of five is carried. The hull is constructed of Alclad, with main fittings of stainless steel.

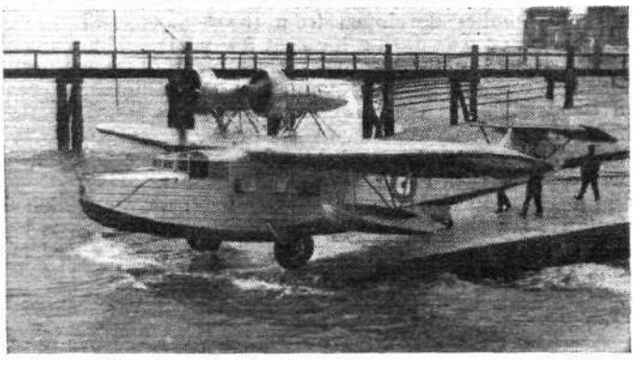


The members of this Rolls-Royce-engined trio of Short flying boats are: (left) the mighty "Sarafand" or R.6/28 (six 825 h.p. "Buzzards"); the "Singapore III" with four "Kestrels" (right), and (bottom) the "gull-winged" R.24/31 (two 775 h.p. "Goshawks"). Top speeds are 150 m.p.h., 145 m.p.h. and 150 m.p.h., in the order of mention. (*Flight* photographs.)









There is a distinct family resemblance between the Vickers-Supermarine "Scapa" and the "Stranraer" or R.24/31 (top left and right). The "Scapa" uses a pair of 525 h.p. "Kestrels" whereas the "Stranraer," a larger boat, is fitted with 690 h.p. "Pegasus IIIs." The Saro "London" (two "Pegasus III") (bottom left) was built to the same specification as the "Stranraer." The "Cloud," another Saro product (bottom right) is an amphibian used for navigational training. (*Flight* photographs)

Designed to the same specification as the Short "Knuckle-duster," the Vickers-Supermarine "Stranraer," as this R.24/31 is named, is a biplane with the engines mounted, as in the "Scapa," close under the top plane. The engines of this machine are Bristol "Pegasus" medium supercharged. The pilots' cockpit is totally enclosed. During very extensive trials the machine was found easily able to maintain level flight with one engine stopped, the other engine showing no signs of overheating. It is claimed that in speed, climb, ceiling and take-off the "Stranraer" is unequalled by any other British flying boat.

The "Stranraer" is designed to operate as a completely self-contained unit, with comfortable working and living quarters for the crew. In spite of this there has been no sacrifice in performance or military qualities, while the seaworthiness has been demonstrated during trials under gale conditions. The placing of the engines under the top plane helps to keep the airscrews clear of spray.

The Saro "London" flying boat is the latest of a "family" of boats produced by Saunders-Roe, Ltd. Substantial orders are now in hand for the R.A.F., and the first production machines will be coming along shortly. It is an unequal-span biplane, with two Bristol "Pegasus" engines mounted close under the top plane. The hull is of the flat-sided type, with longitudinal corrugations in the skin. With a tare weight of 11,100 lb., the normal gross weight of the "London" is 18,300 lb., but this can be increased to an overload gross weight of 22,000 lb. The maximum speed is 135 m.p.h. at 6,500 ft. and the normal range 1,100 miles at 115 m.p.h. With extra petrol the range can be increased to 1,740 miles.

A smaller Saro flying boat is the "Cloud," a twin-engined monoplane with two 340 h.p. Siddeley "Serval" engines. The machine, which is used for flying and navigational training, is an amphibian, with a tare weight of 6,250 lb. and a gross weight of 9,200 lb. The wing area is 650 sq. ft. and the maximum speed 118 m.p.h.

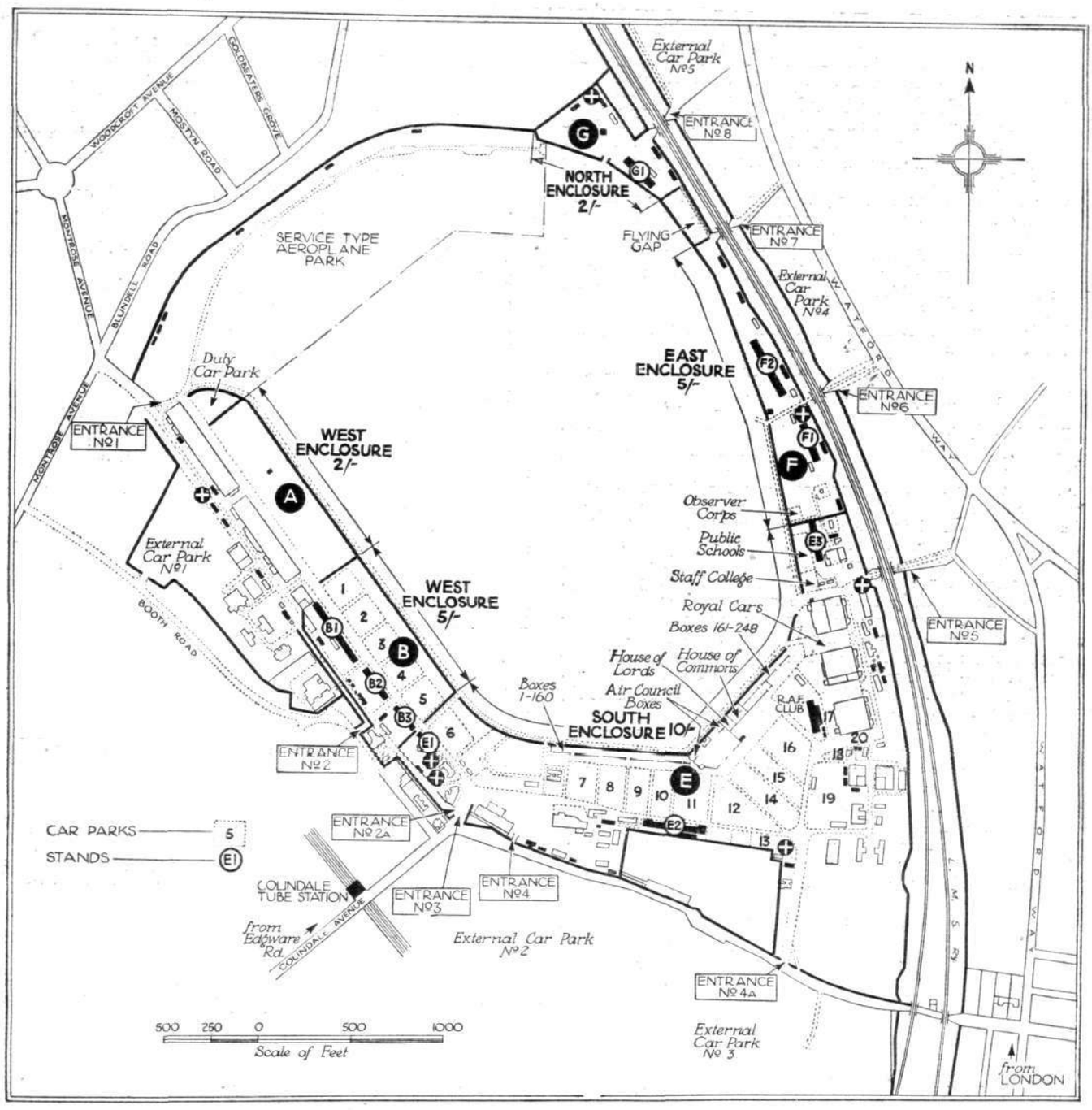
A Plea from Portugal

ON June 10 the *Graf Zeppelin* was diverted from her normal course from South America and passed over Cintra and Lisbon. At Cintra (where people had been waiting to see the airship since 8 a.m. and she arrived just after 7 p.m.) she dropped her mail by parachute. It was picked up by a waiting Heinkel He70 and hurried off to Seville, there to resume its normal route to Germany.

The *Graf Zeppelin* circled slowly over Lisbon at 400 feet, and the scenes in the busy streets (it was the middle of the Lisbon Festivals) were indescribable. Our Lisbon Correspondent comments: What propaganda! What advertisement! What showmanship! When *will* British constructors learn to do similar things? It is true that the Germans will never, in our time, sell any airships to Portugal. Nor is it likely that any H.P. 42 aircraft will ever find a market in this country. But why—oh why!—do not the British make a bit of a noise? It would be so easy for the Air Ministry to send out a flight of "Bulldogs" or "Gauntlets" to take part in a show; but they never do. If Lufthansa can spare a Junkers Ju. 52-3m, and the Heinkel He70 can come here, and the Spanish Aerial Postal Services can send a Douglas D.C.2 (as was done at the recent Lisbon Display), why cannot somebody in Britain manage to send aircraft to demonstrate British aeronautical progress? True, there was an Airspeed "Envoy" at this Display, but no flying demonstration was given.

Next Week's Issue of FLIGHT

TO-DAY'S special issue of *Flight* contains information that is indispensable to the Hendon Display Visitor and forms a souvenir that will be of immense value to all who are interested in the work and equipment of the Royal Air Force. Next week's special issue (Thursday, July 4) will be of equal yet contrasting interest, for it will contain detailed reports, illustrated by many *Flight* photographs, of the R.A.F. Display and the Display (to which the public is not admitted) to be held by the Society of British Aircraft Constructors on Monday. It will prove of particular value to those unable to visit the displays, and both to-day's and next week's special numbers will form useful works of reference.



This map of the Aerodrome shows the position of the enclosures, entrances and other features of interest to the spectator

A GUIDE to the DISPLAY

The Programme : Admission Details : Routes to Hendon

TO judge from the queries which always reach *Flight* during the few days previous to the Royal Air Force Display, there are a number of points about which intending visitors who have not been to previous Displays require information.

In the first place, there are the contents of the programme. On the whole, this year's programme will be very much on the lines of its predecessors, aiming at illustrating the everyday work of the Royal Air Force rather than deliberately seeking the spectacular—though many of the items are intrinsically so.

The main programme begins at 3 p.m., but for the benefit of early arrivals (and it is worth while arriving early, if only for the sake of avoiding the crush) there are eight preliminary events, starting at 12.30 p.m. with the Headquarters Race and consisting of demonstrations of individual aerobatics, refuelling in the air, air gunnery, aerial combat, instructional flying, tactical training, and an item which should not be missed by those who have not previously seen the machine in action—a flying demonstration by the D.H. "Comet"; this is scheduled for 2.10 p.m.

The main (3 p.m.) programme consists of drill by three day bomber squadrons, low-flying attack, "air skittles," army co-operation, parachute demonstration, flight aerobatics, air drill by single-seater squadron, demonstration by Home Defence units, fly-past of flying boats, smoke evolutions, parade and fly-past of new and experimental types, inverted flying, and —in place of the "set-piece" of previous years—a massed fly-past of the squadrons taking part; this will be an impressive item that will give some slight idea of the spectacle to be seen at the Royal Review on July 6. This *finale* takes place at 5.32 p.m. Very full details are set out in the official programme, which is sold in aid of Service charities, and the public is warned against purchasing unofficial and inaccurate programmes outside the aerodrome. (*Cont. overleaf.*)

Prices of admission are as follows: Boxes (to seat six), £4, £5, and £7. Enclosures, 10s. and 5s. Reserved seats on grandstands, 3s. and 2s. 6d. extra. All the foregoing are bookable in advance at the aerodrome (Hendon 8242), at R.A.F. stations, or at any of the usual booking agencies. In addition there is the 2s. enclosure, tickets obtainable at gates only. It should also be mentioned that Sunny Hill Fields, overlooking the aerodrome from the east, are open to the public at a fee of 1s.

Cars are admitted at 10s. or 5s., according to the enclosure chosen; motor cycles are 2s. In addition to the enclosure car parks there are a number of external parks under the management of the A.A. and National Car Parks, Ltd.

The aerodrome is easily accessible by road, lying as it does almost alongside the Edgware Road, about eight miles from Central London, and slightly to the north of the point at which the North Circular Road crosses the main Edgware Road from London.

It is also well served by train, bus and tram services, and many extra vehicles are put on to cope with the crowds. Colindale tube station, alongside the aerodrome, is on the line from Charing Cross to Edgware, the journey taking about forty minutes.

The L.N.E.R. announce that a special train service will be in operation to Mill Hill station; cheap day tickets will be issued from all local stations. Mill Hill station is close to the aerodrome

The following omnibus services pass near the aerodrome: No. 16 (Victoria to Hendon), 60 (Old Ford to Hendon)—both these routes pass Marble Arch—83 (Kew to Golders Green), 121 (Peckham Rye to Mill Hill)—this route runs through Central London—140 (South Harrow to Watford), 142 (Kilburn to Watford), and 143 (Highgate and other northern suburbs to Hendon).

Two tram services, No. 64 (from Paddington) and No. 66 (from Acton) also pass nearby.

Insurance Flying Club's Party

A PARTY which may have far-reaching influence on the costs of operating aircraft was given by the Insurance Flying Club at Hanworth Park last Saturday.

Many of the really important people in the insurance world were there, and not a few of them were given their first experience of air travel in the De Havilland "Dragon" which Mr. Graham Mackinnon provided, together with a pilot from British Continental Airways, the new air line which he and his father, Sir Percy Mackinnon, are opening shortly. The Mackinnons already underwrite aviation risks at Lloyd's and do not, therefore, need converting; but many of those who, through the Club, they were instrumental in getting to Hanworth, had not previously taken any great interest in the matter. It is to be hoped that these people will now be convinced that flying is a sensible means of travel and, as such, should be encouraged by lenient insurance rates.

The Club operates two "Moths" at Hanworth, and during the afternoon both these machines, an Autogiro and a Miles "Hawk" all gave impressive demonstrations. The programme, which was of just the right length, also included items like height-judging competitions, and a parachute drop by Mr. J. E. Benham, who, it is said, recently found life rather dull after his previous experiences and so took up parachute jumping as a means of making life more interesting. We have always held the view that this form of demonstration should be confined to practical work in connection with the sales of parachutes and not extended to stunt entertainment, but we hope that Mr. Benham will have no cause to regret his step.

Prohibited Areas

In more than one article in *Flight* attention has been drawn to the various prohibited areas in Europe, which form obstacles to air touring, and are therefore hampering the development of international air traffic.

This is a matter which has been taken up by the Civil Aviation Section of the London Chamber of Commerce. The Chamber was informed that, as a result of its representations, the Air Ministry had decided to communicate with the International Commission for Air Navigation.

The Chamber now learns that one of the items which came before the Twenty-third Session of the International Commission at Brussels at the end of last month was the examination of traffic difficulties created by prohibited areas.

It is encouraging to know that the Commission, in the interest of the development of international air navigation, has recommended to the contracting States to create prohibited areas only to the minimum extent.

Money for Aero Engine Manufacture

Last week *Flight* announced the issue of shares in two companies—Aero Engines, Ltd. and Pobjoy Airmotors and Aircraft, Ltd. Both these issues were over-subscribed and the lists closed almost as soon as they were opened.

On Tuesday this week an offer of 600,000 5 per cent. £1 cumulative preference shares at 21s. 6d. was made by the Bristol Aeroplane Co., Ltd. In connection with this offer Cazenove, Akroyds and Greenwood and Co. have purchased 360,000 ordinary 10s. shares at 37s. 6d. each, which, it is understood, will be introduced to the market.

The Bristol Company's works cover an area of over thirteen acres and give employment to 4,200 people. The profits shown in the prospectus have risen within the last three years from £117,346 to £217,102. On the basis of average earnings over five years the dividend on the preference shares is covered nearly five times over, and on last year's figure the cover is sevenfold.

Mr. William G. V. Smith is the chairman and Sir George Stanley White the managing director, with Mr. Herbert Thomas the assistant managing director. Capt. F. S. Barnwell and Mr. S. H. Fedden will remain in charge of the aircraft and aero engine design respectively.

A WEEK'S WEATHER

Below appears another of Mr. D. K. Bartlett's "long-range weather forecasts." "Flight" publishes this as a matter of interest, and accepts no responsibility for its accuracy or otherwise.

Thursday, June 27: Flying conditions generally on routes to the Continent will be mostly fine, although unsettled, thundery weather centred over Ireland and the Western areas may spread eastward later in the day. Northern air-route weather will be inclined to be changeable. General state of the air: unchangeable, thundery over Western districts.

Friday, June 28: Bright, good visibility and fair weather. Cloud increasing later in the day on routes to the Continent. Remaining doubtful, and unsettled towards Irish Channel. North-country air routes may expect fair periods, a good deal of cloud. General state of the air: breezy, fairly clear.

Saturday, June 29: Unsettled and changeable, somewhat dull, becoming worse towards Western districts. Fair intervals likely over routes areas to Continent, with periods of wind between; thundery tendencies, especially later in the day. General state of the air: Some wind and disturbed conditions.

Sunday, June 30: Mainly fair and bright, good visibility periods, although the continued disturbance over Western coasts of England and Wales may affect the routes to the Continent and to the north, particularly during the afternoon and evening. General state of the air: Much moisture in the air; cloudy and breezy.

Monday, July 1: Mainly fine, but continued doubtful weather from Western areas will affect the routes to the Continent. A good deal of moisture and cloud may affect British Isles generally.

Tuesday, July 2: Considerable cloud, moisture, showers and a thundery tendency along the routes to the Continent and to the North, improving over Western areas and Ireland. General state of the air: Unsettled, especially later.

Wednesday, July 3: Improving weather generally and a more even state of conditions. Some cloud along routes to the Continent and breezy on the Northern lines. General state of the air: Breezy, some moisture and cloudy.

BEHIND the SCENES at HENDON

What the Display Spectator does Not See—the Year-round Work of Organisation

DOES the average visitor to the Royal Air Force Display at Hendon realise what an enormous volume of planning and organisation lies behind that superbly run aeronautical tattoo? A peep behind the scenes elicits some interesting and surprising facts.

As is fairly obvious, the organisation is divided into two sections—flying and administration. This last term, broadly speaking, may be said to cover everything apart from the actual flying and those matters directly connected with it

There is a Display Committee, at the head of which is Air Chief Marshal Sir Robert Brooke-Popham, K.C.B., C.M.G., D.S.O., A.F.C., A.D.C. The whole of the flying side of the display is organised by a Flying Sub-Committee under the chairmanship of A.V.-M. Joubert de la Ferté, while the remainder of the organisation is undertaken by a General Purposes Committee, the secretary of which is Air Comdre. B. C. H. Drew, C.M.G., C.B.E., by whose courtesy material for the following notes was obtained.

The two sections are entirely separate and distinct. Each has its own services—transport, fire engines, ambulances, etc.—and for all practical purposes the sections operate in two distinct areas—inside and outside a perimeter formed by the fence dividing the public enclosure from the aerodrome surface proper.

As the organisation is virtually a year-round business it is interesting first of all to see what happens when a display is over. In the first place the aerodrome itself must be cleared up. Immediately after the S.B.A.C. show on the Monday work starts on the removal of all but the few permanent enclosure fences; tents and marquees are struck, borrowed motor transport returned, notice boards taken down and countless other jobs attended to.

Laying the Foundations

Simultaneously, both the administration and flying sides start laying the foundations for the following year's display, the detailed reports of the duty officers being carefully studied and notes made for future reference.

Weeks of office work follow—contracts to be reviewed, the display's standing "book of the words" (a most impressive volume) to be revised, a tentative map of next year's enclosures to be prepared, and so forth. Incidentally, the map is revised from a mosaic, or aerial photograph.

The display office closes for one brief fortnight in August, then in the autumn comes a full-dress committee meeting under the chairmanship of the A.O.C.-in-C., when a programme is roughed out and various matters of general policy discussed. Then the Flying Committee and the General Purposes Committee go their own ways and each proceeds to work out its organisation in detail.

The nature of the programme is usually settled fairly exactly by the beginning of the year, and any necessary rehearsals held, though, strictly speaking, only the few rehearsals such as that staged at Northolt a few weeks ago, and the full-scale affairs on the two days previous to the display, merit the term "rehearsal"; it must always be borne in mind that the display is almost entirely a demonstration of normal Royal Air Force duties and, therefore, the everyday work of the units is, in effect, practical preparation. Nevertheless, the Flying Committee has a Herculean task in co-relating arrangements to which a score of flying units all over the country are contributing.

Meanwhile, the General Purposes Committee has been busy, ticket agencies have been supplied, the police and motoring organisations consulted regarding traffic handling, the L.P.T.B. conferred with on the subject of buses and trains, and countless other matters attended to. Six weeks or so before the great day Hendon begins to show outward and visible signs of activity. The work of erecting enclosures, notices and so forth proceeds apace. The figures relating to the enclosures

Air Chief Marshal Sir Robert Brooke-Popham and A.V.-M. Joubert de la Ferté, Chairmen respectively of the Display Committee and the Flying Sub-Committee, watching a rehearsal at Northolt. (*Flight* photograph.)

are positively staggering—thirty-five miles of wire, eight to ten of rope, three of iron fencing, and five of chestnut paling! In addition, there is the little matter of a couple of hundred canvas buildings, ranging from the Royal marquee to the bell tents of the display personnel.

During the few days previous to the event the aerodrome becomes fairly inundated with people doing jobs of work, especially as the advance guard of the flying organisation has by this time arrived, and is busy marking out a "gridiron" for parking its machines along the northern boundary, establishing its control, refuelling, fire engine and ambulance points, and generally busying itself at all sorts of necessary tasks.

Small snags in any part of the organisation, inside or outside the perimeter, are ruthlessly hunted out and eradicated during the full-dress rehearsal on the penultimate day; no risk must be taken of upsetting the clockwork-like precision which is such a striking feature of the display itself. When every programme item—indeed, every phase of each item—is scheduled to a certain hour, minute *and* second, flawless operation is essential.

But to return to the matter of crowds. While the numbers of people who have paid for admission may be anything up to 169,000—the record figure, reached in 1931—it is estimated that the thousands who occupy free vantage points in the surrounding countryside probably bring the total up to half a million. Three thousand police, counting, of course, the extra men on traffic work on miles of roads leading to Hendon—are on duty, which, perhaps, is not surprising when it is remembered that anything up to 12,000 cars may converge on the aerodrome.

In conclusion, it is interesting to note that, since statistics have been kept, the attendance of the public rose from 88,959 people in 1927 to 169,208 in 1931; that was the peak year, the gross receipts totalling £27,585 6s. 11d. There was a falling-off to only 108,267 in 1933—a vile day as regards weather—and a recovery to 136,237 (£20,140 7s. 9d.) last year. Such figures mean very, very useful help to the half-dozen Royal Air Force charities in aid of which the event is organised.

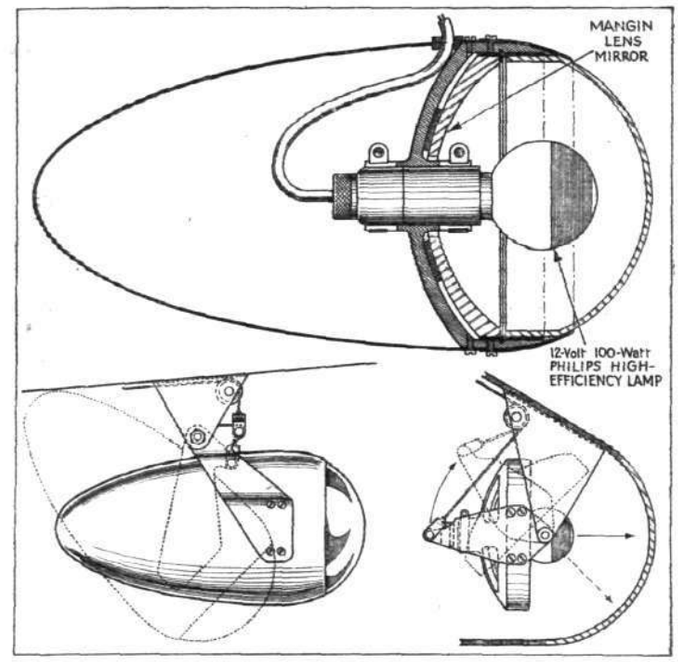
THE INDUSTRY

AIRCRAFT HEADLIGHTS

FOR some time Vickers-Armstrongs, Ltd., have been making aircraft headlights in two types, external and internal. The lamps are similar and certain parts interchangeable, the main difference being that the external type is fitted with a hemispherical front glass and a streamlined tail-piece. A high degree of optical efficiency is obtained, it is claimed, by the use of a Mangin lens mirror in conjunction with high-efficiency lamps specially produced by Philips Lamps, Ltd. Originally 100-watt lamps only were supplied, but to meet the demand for more light lamps of 144 and 250 watts are now available. The voltage in all cases is the standard 12 volts. The weight of the external lantern, complete with lamp, but without brackets, etc., is 4lb., while the internal lantern weighs 2¼lb.; the diameter of the mirror is six inches.

Certain aircraft constructors install one lantern only, while others install two—one starboard and one port—in the leading edges of the wings. The latter system has the advantage of safety in the event of one filament burning out; also one lamp can be focused to give a long-range narrow beam and one a short-range wide beam. Further, the pilot's line of vision is along the unlighted space between the two beams of light. This is particularly desirable in the event of the aircraft landing during foggy or misty conditions. Other constructors prefer to hinge the lantern to provide for adjustment in the vertical plane with control by the pilot.

Experiments are being made with the view of still further increasing the efficiency and decreasing the weight of the lamp. In addition to these lamps, incidentally, Vickers-Armstrongs, Ltd., manufacture the well-known Holt Flare Bracket under licence.



These sectional drawings of the Vickers aircraft landing light are self-explanatory. At the top are shown details of the lamp, and on the left, below, a suggested method of trunnion mounting, the inclination of the lamp being controllable by cable. On the right is the method of mounting the lamp in a leading edge.

NEARLY 1,000 IIIF's

News that no fewer than 950 Fairey IIIFs (including, that is, "Seals" and "Gordons," which are actually IIIFs with "Panther" engines) have been built to date means that, except, perhaps, for training aircraft, this type has been built in larger numbers than any other military aircraft.

One of the latest versions of the IIIF, with a Bristol "Pegasus" engine and three-bladed metal airscrew, has been supplied as a seaplane to the Latvian Government. This version has a top speed of 153 m.p.h.

A NEW POST

Sqn. Ldr. J. L. N. Bennett-Baggs has been elected to the board of directors of the Blackburn Aeroplane and Motor Co., Ltd. Sqn. Ldr. Bennett-Baggs has had considerable flying experience, having served with the R.F.C. and R.A.F. from 1916 to 1923, during part of which time he was a test pilot at Farnborough.

After being placed on the Reserve in 1923 he was with Armstrong-Whitworth Aircraft, Ltd., and A. V. Roe, Ltd. as chief consultant test pilot and representative. He will remain in charge of sales in the London office of the Blackburn Company at Amberley House, Norfolk Street, Strand, W.C.2.

The full board of the company now consists of Mr. Robert Blackburn, Major Bumpus, Messrs. R. Rhodes and E. Hudson, and Sqn. Ldr. Bennett-Baggs.

OIL AND THE "GULL"

On his one-day flight to Africa and back Captain E. W. Percival used Patent Castrol XXL oil in the "Gipsy Six" engine of his Percival "Gull."

RADIO AT LISBON SHOW

Among the exhibits which aroused interest at the recent Lisbon Aero Show (described in *Flight* of June 13) was a very complete display, both of actual equipment and photographs, by Marconi's Wireless Telegraph Co., Ltd.

Incidentally, a Marconi Type A.D. 41B/42A equipment has been fitted to the new D.H.89 ordered for the use of the Air Council.

YOUNG ENTHUSIASTS, members of the Skybird League, who recently visited the new aerodrome at Southend-on-Sea as guests of the Southend Flying Club. They are seen standing by the Club's Short "Scion," in which Mr. A. M. Glover (Chief Instructor) gave many of them flights.

FLIGHT

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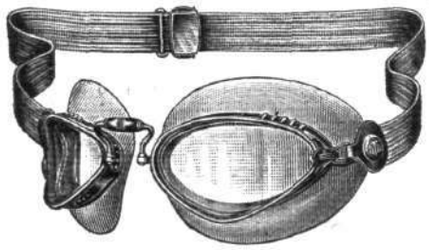

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A. P. THURSTON & CO., Chartered Patent Agents, 329, High Holborn, W.C.1. Tel. Hol. 1117.

GEE & CO. (Established 1905.) Patents and Trade Marks throughout theWorld. (H.T.P. Gee, Mem. R.S.G.B., A.M.I.R.E., etc.), 51-52, Chancery Lane, London, W.C.2 (2 doors from Govt Patent Office). 'Phone: Holborn 1525. Handbook free.

KINGS Patent Agency Ltd (B. T. King C.I.M.E., Patent Agent, G.B., U.S.A., Canada). Advice, Handbook, Consultations free. 49 years' refs. 146a, Qn. Vic. St., E.C.4. City 6161

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DRAUGHTSMEN with experience of Air Ministry Modification systems. Apply stating age, qualifications and salary required to Frank B. Halford, 9, Golden Square, London, W.1.

FIRST-CLASS Senior Aircraft Draughtsmen and Stressman required. Write stating age, experience and salary required to British Aircraft Manufacturing Co., Ltd., Hanworth Aerodrome, Feltham, Middlesex.

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